STRUCTURE OF MICROCARD

A01/1 = Structure of microcard

A03/1 = Special features, general information, safety precautions, testers and tools, tightening torques, test set-up, diagram of lines and connection diagram

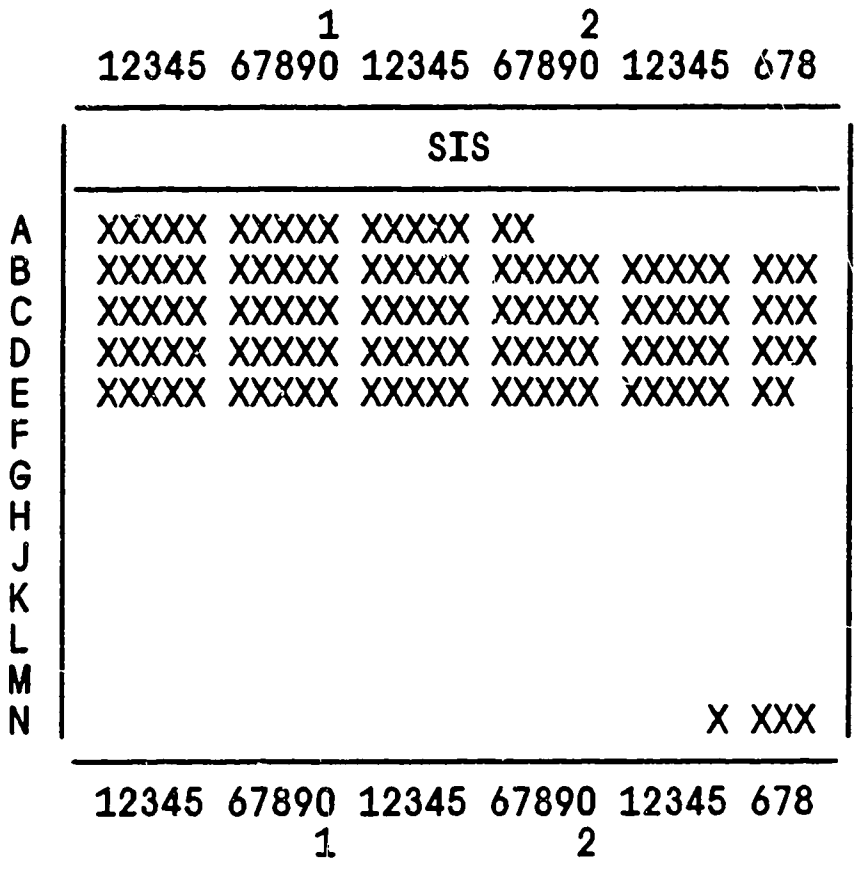
C01/1 = Checking fuel-injection pump

N21/1 = Index

N24/1 = Table of contents

N28/1 = Editorial note

Continue: A02/1 Fig.: A01/2



Continue: A02/1

STRUCTURE OF MICROCARD

The user prompting appears on every page, e.g.:
- Continue: B17/1
- Continue: B18/1 Fig.: B17/2

.../1 = Upper coordinate half
.../2 = Lower coordinate half

Continue: A03/1

ADJUSTING AND CHECKING DISTRIBUTOR-TYPE FUEL-INJECTION PUMP

These instructions deal with the checking and adjustment of distributor-type fuel-injection pumps w i t h n o :

- boost-pressure-dependent full-load stop
- (LDA) and hydraulic
- torque control (HBA)

Special features:

* Temperature-dependent excess fuel quantity (TAS)
* Temperature-dependent idle increase (TLA)
* Temperature-dependent, mechanical or hydraulic cold-start acceleration device (KSB)

Continue: A03/2

ADJUSTING AND CHECKING DISTRIBUTOR-TYPE FUEL-INJECTION PUMP

Special features:

* Housing-fixed idle increase (LFG)
* Locked timing with and without locking screw
* Adjustment of switching valve for exhaust gas recirculation
* Attachment of lever for spring-actuated power on/off damper

Continue: A04/1

CHECKING INSTRUCTIONS

General
These test instructions contain all the necessary information and data to be observed when adjusting and checking the distributor-type fuel-injection pump.
- Information on calibrating oil is to be taken from table of contents W-400/00.
The sequence of operations described corresponds to the sequence of information in the test-specification sheet.

EXCEPTION: Full-load pre-adjustment

Continue: A04/2

CHECKING INSTRUCTIONS

Note on test specifications

When adjusting distributor-type fuel-injection pump, the only settings which apply are those which are not given in brackets in the test-specification sheet.

Continue: A05/1

CHECKING INSTRUCTIONS

Functional test (check):

If the distributor-type fuel-injection pump is merely checked for proper functioning and adjustment w i t h o u t prior repair, use is to be made for this test of the values i n b r a c k e t s in the test-specification sheet (check values).
The settings n o t in brackets apply if the distributor-type fuel-injection pump has to be corrected.

Continue: A05/2

CHECKING INSTRUCTIONS

Item numbers:

Item numbers appearing in the text do n o t correspond to the item numbers in the service-parts list.

Continue: A06/1

SAFETY PRECAUTIONS

The following safety precautions are to be observed in addition to the safety precautions given in the operating instructions for Bosch injection-pump test benches:

1. Damaged fuel-injection pumps are not to be tested.
2. The tools, drive components and clamping parts prescribed in these instructions are to be employed to avoid the danger of accident. Damage to the unit under test and incorrect settings may also be the consequence.

Continue: A06/2

SAFETY PRECAUTIONS

3. Install test-pressure lines on delivery-valve holder and calibrating nozzle-holder assembly. Take care not to damage connecting nipple of test-pressure line when doing so. A damaged connecting nipple may allow calibrating oil to emerge at high pressure. DANGER OF INJURY.

Continue: A07/1

SAFETY PRECAUTIONS

4. Test pressure lines which are kinked and damaged at the sealing surfaces of the connecting nipples, and test pressure lines with impermissible bending radii are to be replaced (refer to W-400/000: "Test benches, test equipment and instructions on testing fuel-injuection pumps"). If use is made of damaged test pressure lines for test purposes, this will result in adjustment errors. High-pressure calibrating oil can emerge through a damaged line and result in injury.

Continue: A07/2

SAFETY PRECAUTIONS

5. Before the fuel-injection pump is driven by means of the injection-pump test bench, the pump should be checked by hand for freedom of movement. If the pump drive or moving pump parts has/have siezed up and the injection pump is driven, this may result in further damage to the injection pump and test bench.

Continue: A08/1

SAFETY PRECAUTIONS

6. The unit under test may only be checked in the prescribed direction of rotation and at the maximum prescribed speed.
The direction of rotation and the maximum prescribed speed are to be taken from the appropriate test-specification sheet.

Continue: A08/2

SAFETY PRECAUTIONS

Make exclusive use of the special tools/testers indicated in these test and repair instructions!

The use of other tools/testers could lead to DANGER OF INJURY! System adjustment errors are also possible.

Continue: A09/1

TOOLS AND TEST EQUIPMENT

Clamping flange 1 685 720 062
Pilot, 50 mm diameter /

Clamping flange 1 685 720 219
Pilot diameter 68 mm/
e.g. VE..R119

Clamping flange 1 685 720 018
Pilot diameter 68 mm/
e.g. VE..L19

Measuring device 1 688 130 139
Measurement of timing-device travel

Continue: A09/2

TOOLS AND TEST EQUIPMENT

Intermediate flange 1 465 700 301
VE..R14/15

Coupling half 1 686 430 022
Taper 17 mm

Coupling half 1 686 430 024
Taper 20 mm

Coupling half 1 686 430 010
Taper 25 mm e.g. VE..R119

Testing device 1 688 130 075
Measurement of inlet and supply pump
pressure

Continue: A10/1

TOOLS AND TEST EQUIPMENT

Puller Extraction of slotted spring pin of control valve	KDEP 1027
Socket wrench Installation of control valve	KDEP 1086
Adjustment tool Adjustment of governor shaft	KDEP 1082
Stamping tool Stamping of 2-piece control lever	KDEP 1107

Continue: A10/2

TOOLS AND TEST EQUIPMENT

Stamping tool Stamping of spacer sleeve for full-load screw	KDEP 1106
Pressing-in tool Adjusting pressure of supply pump	KDEP 1092
Pressing-in tool Pressing in slotted spring pin of pressure regulator	KDEP 1093
Fixing pin Adjustment of notched plate	KDEP 1108

Continue: A11/1

TOOLS AND TEST EQUIPMENT

Clamping bracket, test bench
1 688 010 101
Distributor-type fuel-injection pumps
R14 and R15

Prestroke measuring device
1 688 130 180
Replacement for ..045
Adjustment of prestroke

Dial indicator, scale divisions
0.01 mm with M3 base thread
1 687 233 012

Temperature indicator 1 687 230 029
Measurement of overflow temperature

Continue: A11/2

TOOLS AND TEST EQUIPMENT

Puller KDEP 1131
Drive pinion, pump drive shaft

Spacer KDEP 1084
Calibrating "MS" dimension

Adjustment tool KDEP 1152/3
Adjusting stop lever

Holding device KDEP 1140
Nozzle-holder assembly

Setting mandrel KDEP 1173
Blocking of coupling half

Continue: A12/1

TOOLS AND TEST EQUIPMENT

Dial-indicator holder	KDEP 1088
Centering sleeve	KDEP 1088/0/3
Measurement insert Adjusting K1 dimension	KDEP 1088/0/2
Wrench Removal of central screw plug	KDEP 1080
Spacer Adjusting part-load delivery, EGR	KDEP 1176
Adjusting screw Fixing control lever	KDEP 1177

Continue: A12/2

TOOLS AND TEST EQUIPMENT

Adjustment gauge Stop bracket for switching valve EGR	KDEP 1175
Spring tensioner Positioning control lever at spacer	KDEP 1179
Adjustment tool Adjusting LFB	KDEP 1181
Multi-way cock (Flushing valve)	1 687 409 030

Continue: A13/1

TIGHTENING TORQUES

Select torque data in accordance with following add-on modules:

VE without add-on module	A15
2-piece control lever	A19
Vent screw at level of cam roller ring	A20
Coupling half and flange	A21

Continue: A13/2

TIGHTENING TORQUES

Select torque data in line with following add-on modules:

Hydraulic cold-start acceleration device	A23
Pneumatic idle increase	A25
Temperature-dependent idle increase (TLA)	A26
Additional lever for spring-actuated power on/off damper	A27

Continue: A14/1

TIGHTENING TORQUES

Select torque data in line with following add-on modules:

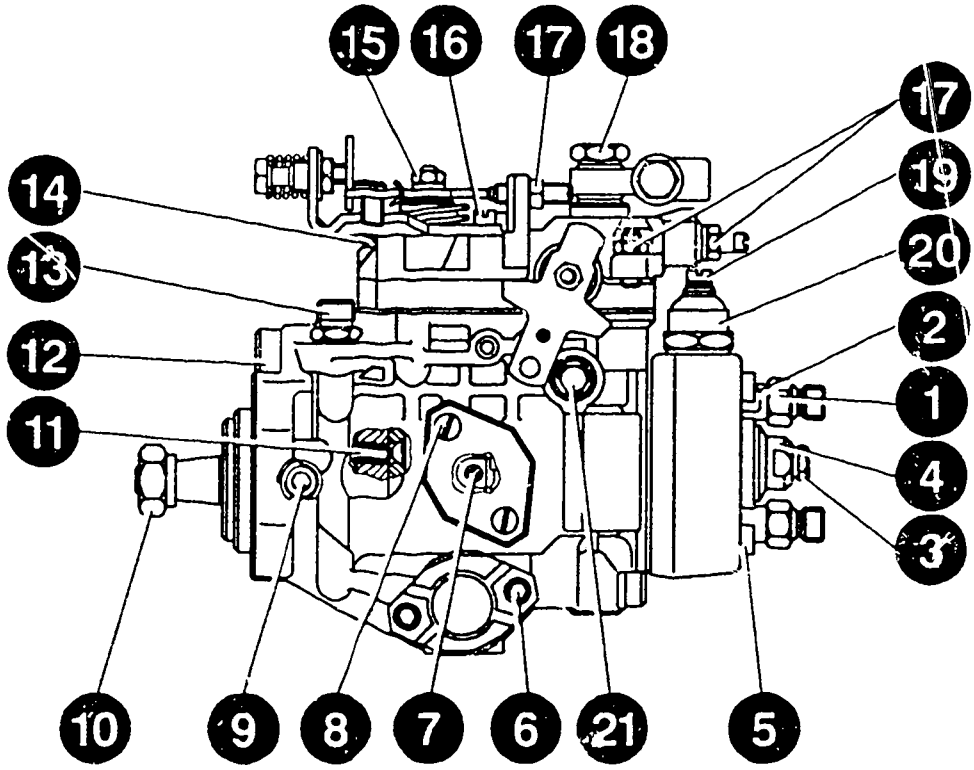
Stop bracket for switching-point adjustment	A28
Fastening screws for switching valve	B01
Securing plate	B02
Microswitch	B03

Continue: A15/1

TIGHTENING TORQUES FOR PUMP WITHOUT ADD-ON MODULE

1 =	Delivery-valve holder	38..42 Nm
	Used delivery-valve holders	
	Delivery-valve holder	38..48 Nm
	New delivery-valve holders for new distributor heads	
2 =	Bleeder screw	5.. 8 Nm
3 =	Bleeder screw	20..26 Nm
4 =	Screw plug	70..90 Nm
5 =	Fillister-head/hexagon-head cap screw	7..10 Nm
6 =	Fillister-head screw	10..14 Nm
7 =	Fillister-head screw - pointer	2.. 3 Nm
8 =	Fillister-head screw	6.. 9 Nm
9 =	Locking screw	27..35 Nm

Continue: A16/1 Fig.: A15/2



KMK02238

TIGHTENING TORQUES FOR PUMP WITHOUT ADD–ON MODULE

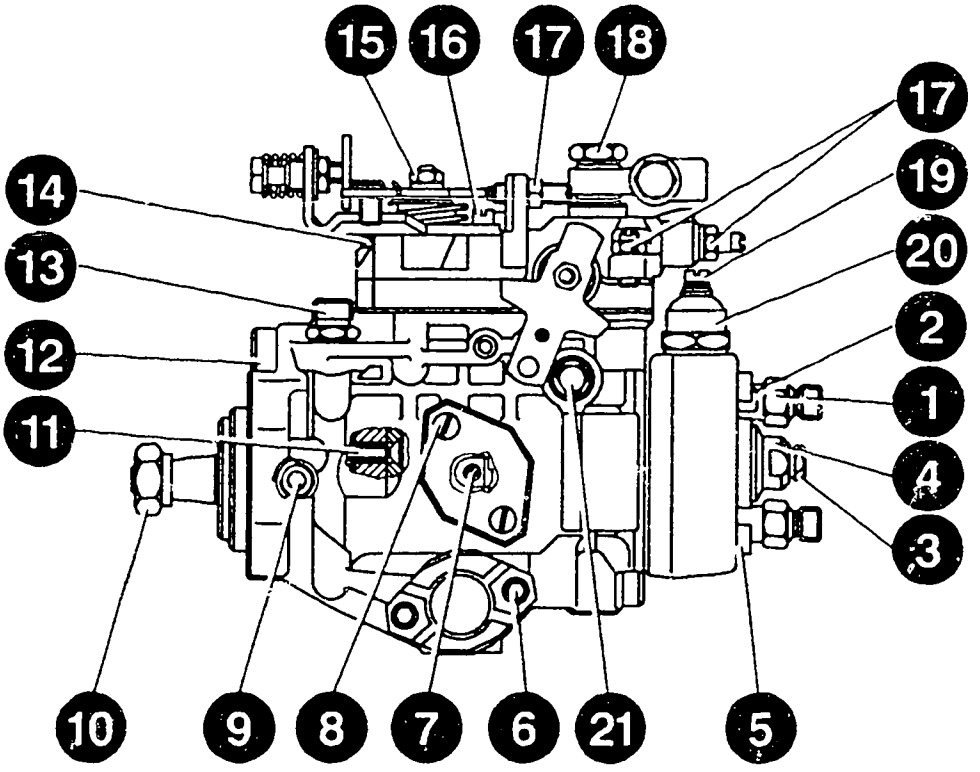
10 = Hexagon nut 60..70 Nm
Thread M12 / taper 17 mm
Part no. 2 915 011 011

Hexagon nut 90..95 Nm
Thread M14x1.5 /taper 20
Part no. 2 915 021 004
Part no. 1 463 300 316

Flat nut 70..75 Nm
Thread M14x1.5 /taper 20
Part no. 2 915 042 106

11 = Countersunk screw, supply pump 2.. 4 Nm
12 = Slotted hexagon nut 22..30 Nm

Continue: A17/1 Fig.: A16/2

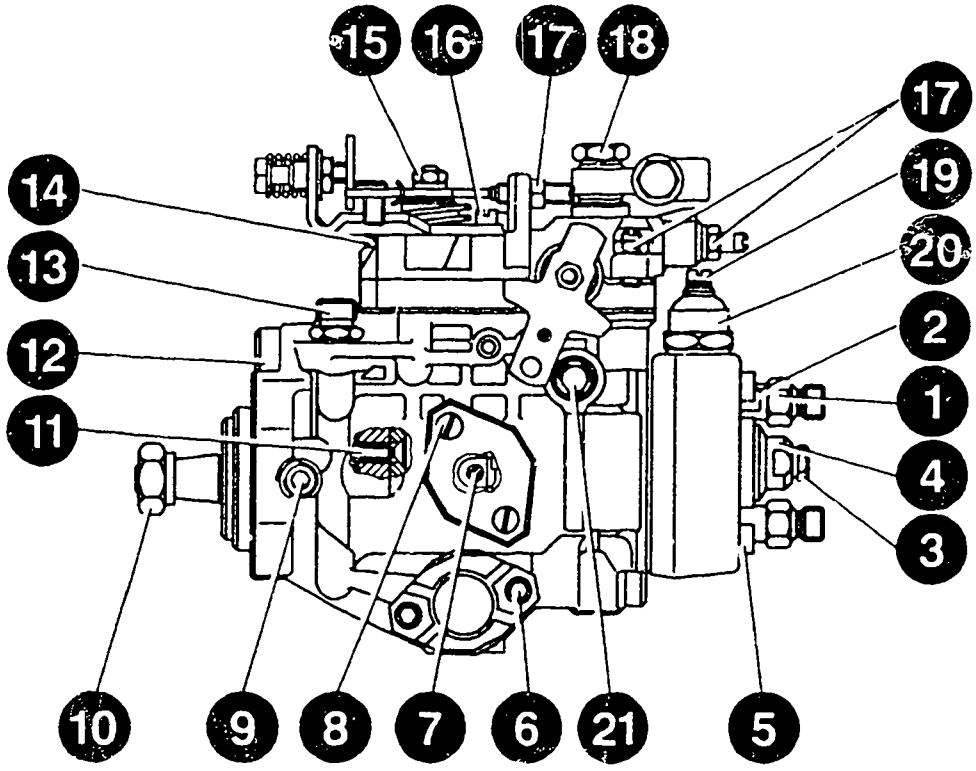


KMK02238

TIGHTENING TORQUES FOR PUMP WITHOUT ADD–ON MODULE

13 =	Tube fitting / or reducer bushing	20..30 Nm
14 =	Hexagon–socket–head cap screw/ fillister–head screw	7..10 Nm
15 =	Securing nut for all control levers	5..10 Nm
16 =	Hexagon–socket–head cap screw/ fillister–head screw	7..10 Nm
17 =	Hexagon nut	6.. 9 Nm
18 =	Overflow restriction	Nm
19 =	Hexagon nut / fillister–head screw	1.5..2.5Nm
20 =	Solenoid valve	15..25 Nm
21 =	Shoulder screw	10..15 Nm

Continue: A18/1 Fig.: A17/2

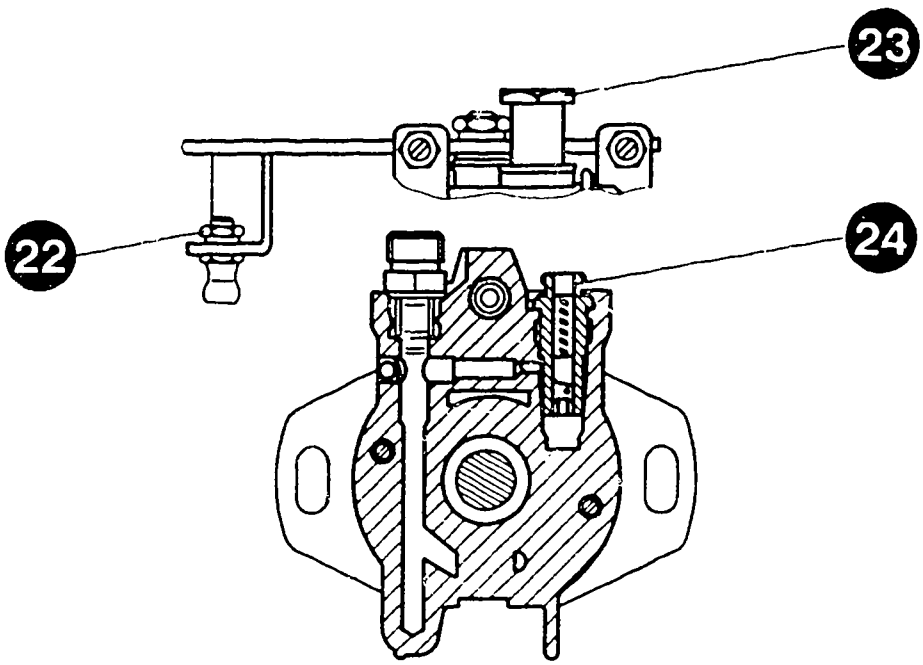


KMK02238

TIGHTENING TORQUES FOR PUMP WITHOUT ADD-ON MODULE

22 =	Hexagon nut	3.. 5 Nm
23 =	Reducer bushing with attached inlet union	20..30 Nm
24 =	Pressure regulator	7..10 Nm

Continue: A19/1 Fig.: A18/2

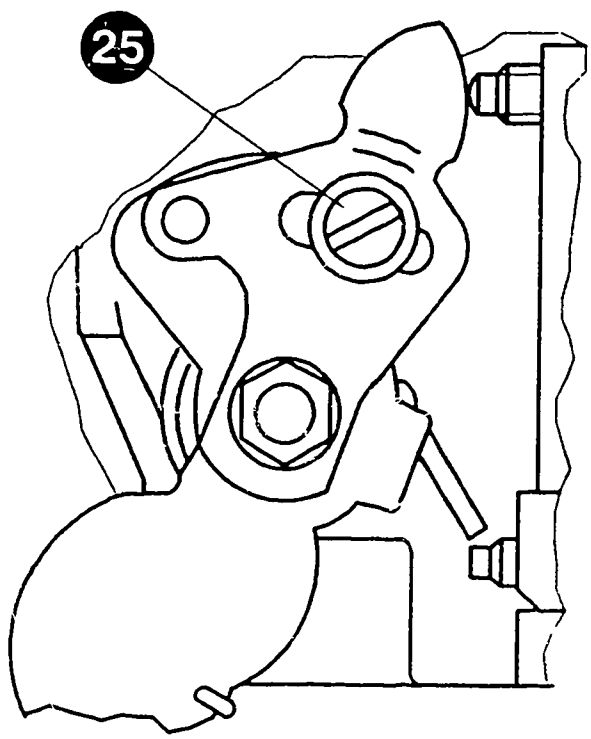


KMK02239

TIGHTENING TORQUES FOR PUMP WITH
TWO-PIECE SPEED-CONTROL LEVER

25 = Hexagon nut/
fillister-head screw 6.. 9 Nm

Continue: A20/1 Fig.: A19/2

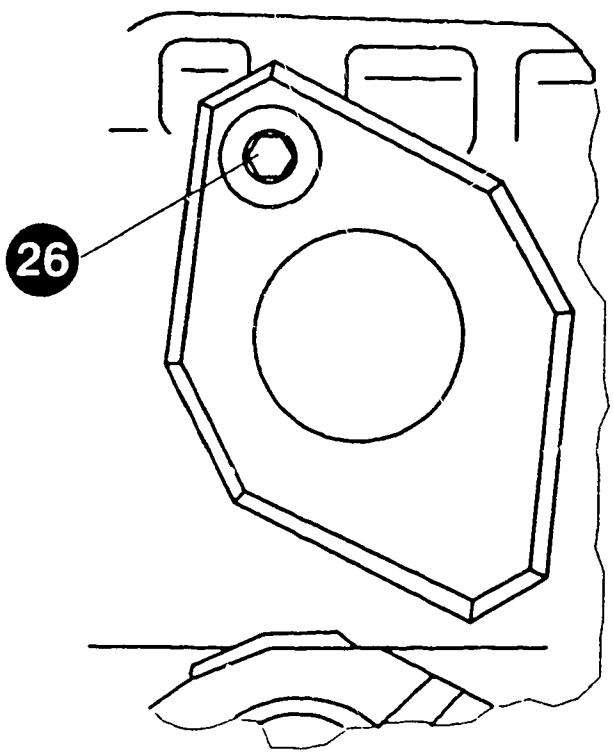


KMK02240

TIGHTENING TORQUES FOR PUMPS WITH BLEEDER SCREW

26 = Bleeder screw 3.. 5 Nm

Continue: A21/1 Fig.: A20/2

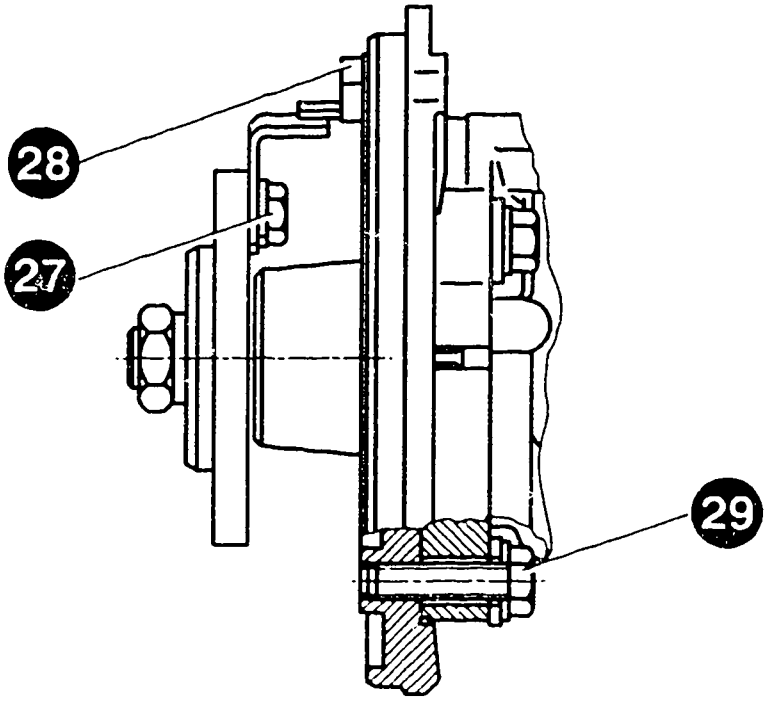


KMK02241

TIGHTENING TORQUES FOR PUMP WITH COUPLING HALF AND FLANGE

27 =	Hexagon bolt	7..10 Nm
28 =	Hexagon-socket-head cap screw	2.. 3 Nm
29 =	Hexagon bolt	16..24 Nm

Continue: A22/1 Fig.: A21/2

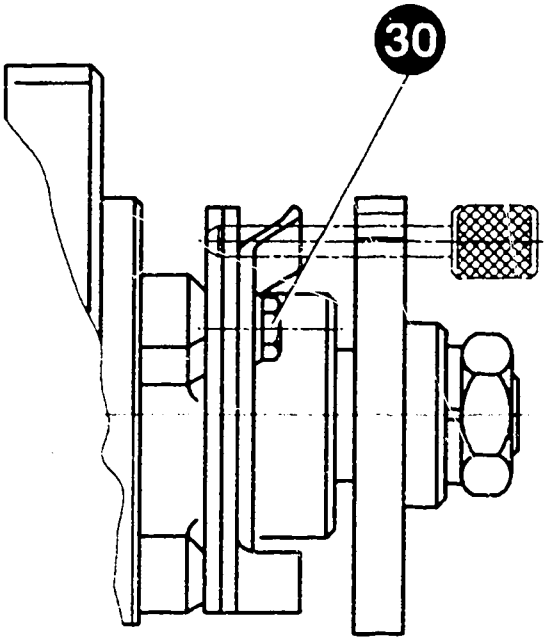


KMK02242

TIGHTENING TORQUES FOR PUMP WITH COUPLING HALF AND FLANGE

30 = Hexagon bolt
Notched plate 4.0...6.0 Nm

Continue: A23/1 Fig.: A22/2

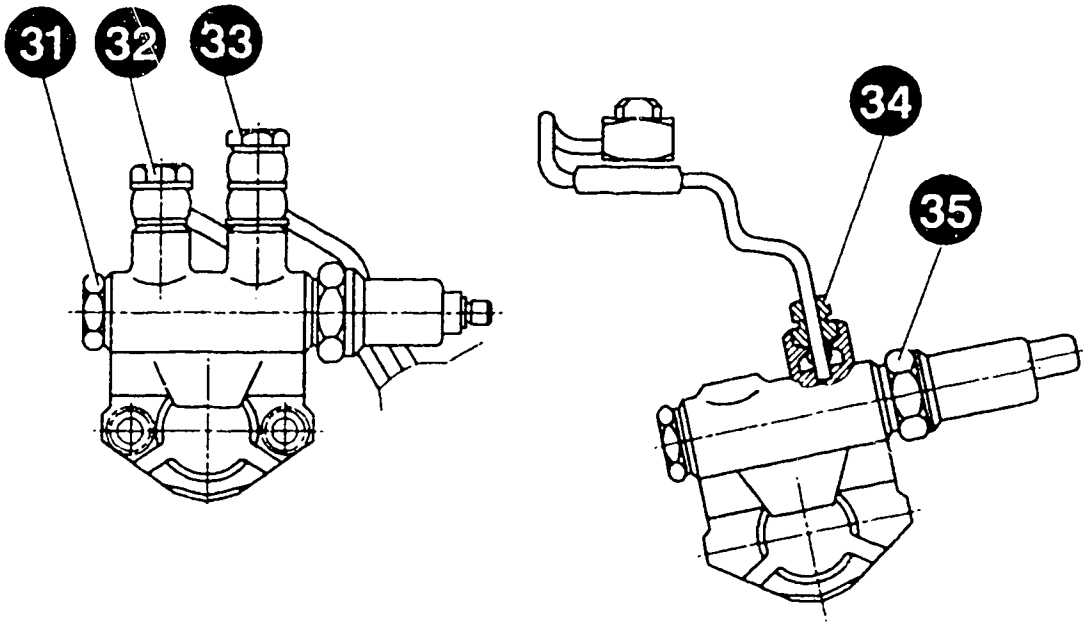


KMK02243

TIGHTENING TORQUES FOR PUMP WITH HYDRAULIC KSB

31 = Valve insert	10..15 Nm
32 = Reducer bushing	8..12 Nm
33 = Reducer bushing	8..12 Nm
34 = Retaining screw	6..10 Nm
35 = Thermocouple	20..25 Nm

Continue: A24/1 Fig.: A23/2

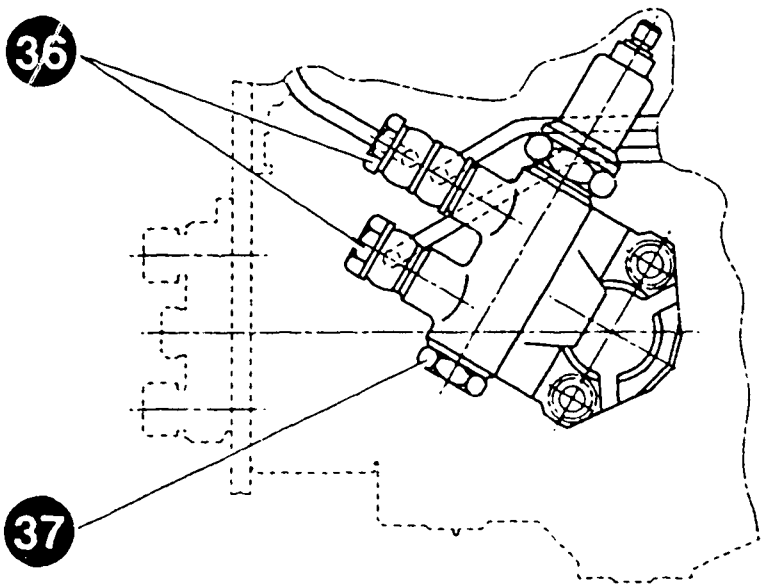


KMK02244

TIGHTENING TORQUES FOR PUMP WITH HYDRAULIC KSB

36 = Reducer bushing	8.0...11.0 Nm
37 = Valve insert	10.0...15.0 Nm

Continue: A25/1 Fig.: A24/2

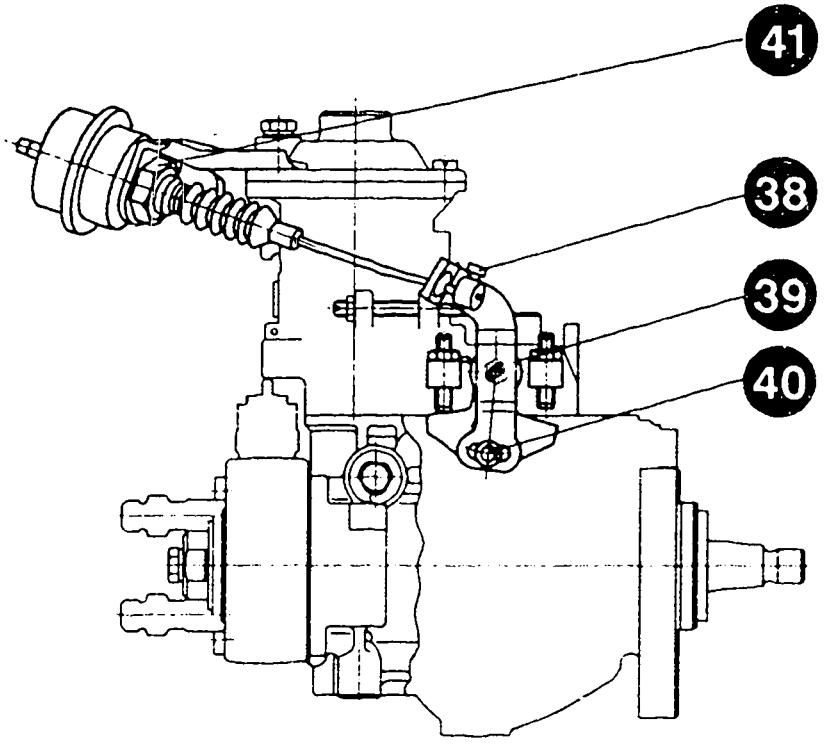


KMK02245

TIGHTENING TORQUES FOR PUMP WITH PNEUMATIC IDLE INCREASE (PLA)

38 = Slotted screw	2.0...3.0 Nm
39 = Hexagon bolt	3.0...5.0 Nm
40 = Hexagon bolt	5.0...7.0 Nm
41 = Securing nut	20...25 Nm

Continue: A26/1 Fig.: A25/2

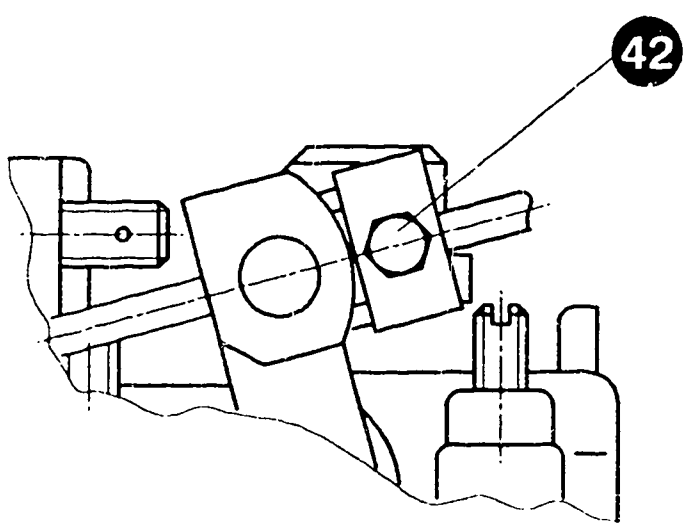


KMK02246

TIGHTENING TORQUES FOR PUMP WITH TEMPERATURE-DEPENDENT IDLE INCREASE (TLA)

42 = Hexagon bolt 2.0...3.0 Nm

Continue: A27/1 Fig.: A26/2

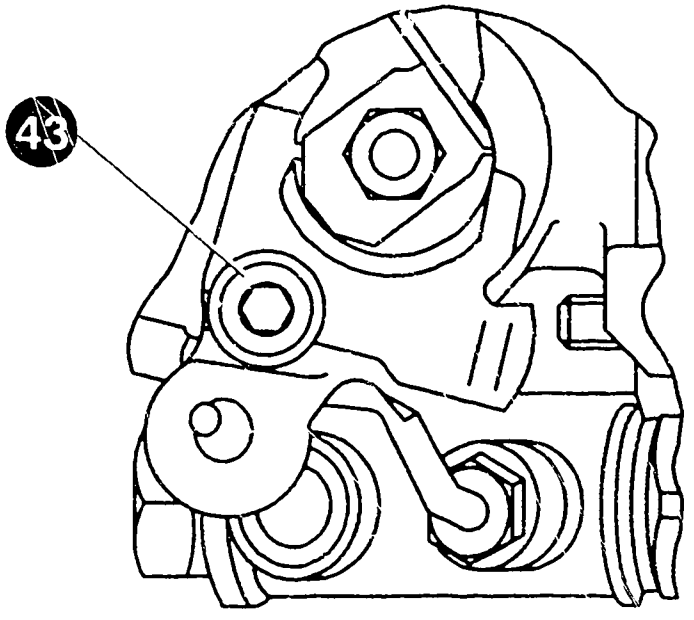


KMK02247

TIGHTENING TORQUES FOR PUMP WITH ADDITIONAL LEVER FOR SPRING-ACTUATED POWER ON/OFF DAMPER

43 = Fastening screw 6... 9 Nm

Continue: A28/1 Fig.: A27/2

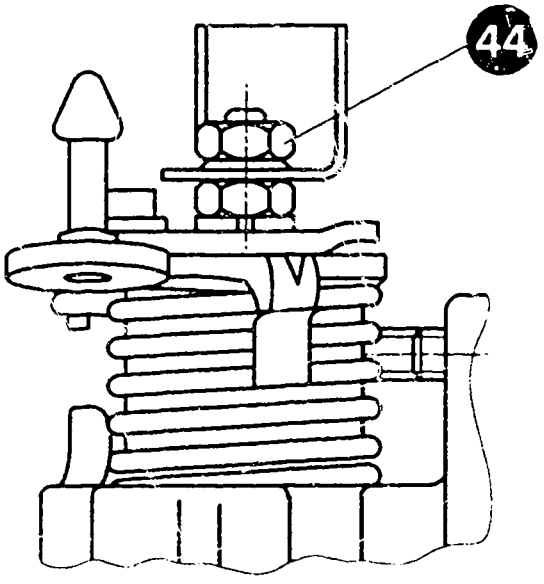


KMK02248

TIGHTENING TORQUES FOR PUMP WITH STOP BRACKET FOR SWITCHING-VALVE ADJUSTMENT

44 = Hexagon nut	5...10 Nm

Continue: B01/1 Fig.: A28/2

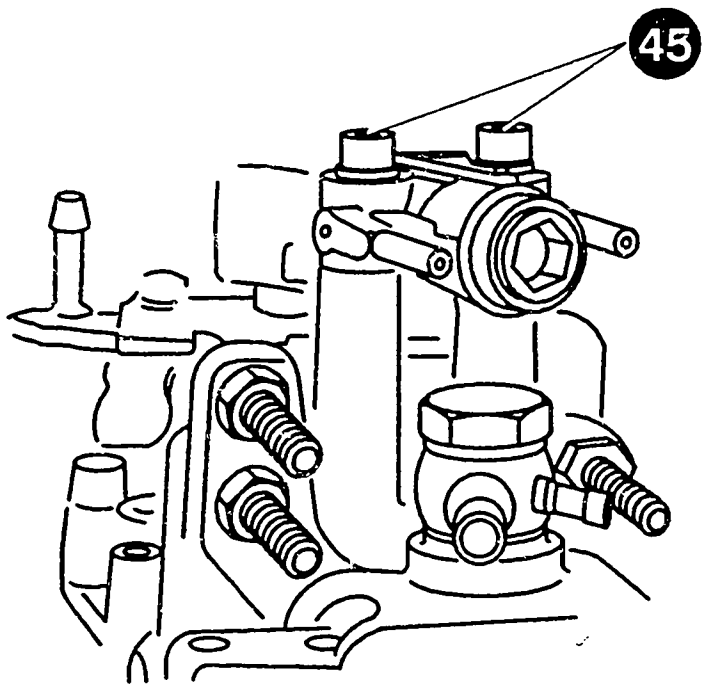


KMK02249

TIGHTENING TORQUES FOR PUMP WITH SWITCHING VALVE

45 = Torx bolt M5 2... 3 Nm

Continue: B02/1 Fig.: B01/2

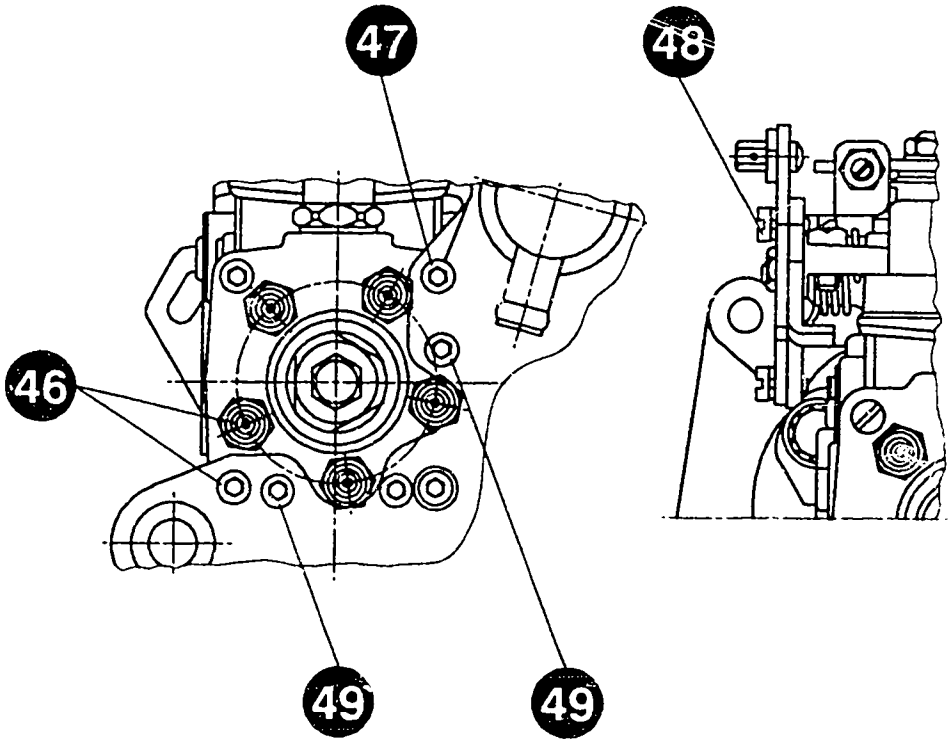


KMK02250

TIGHTENING TORQUES FOR PUMP WITH SECURING PLATE

46 =	Torx bolt	10...14 Nm
47 =	Torx bolt	10...14 Nm
48 =	Fillister-head screw	3... 5 Nm
49 =	Hexagon-socket-head cap screw	7...10 Nm

Continue: B03/1 Fig.: B02/2

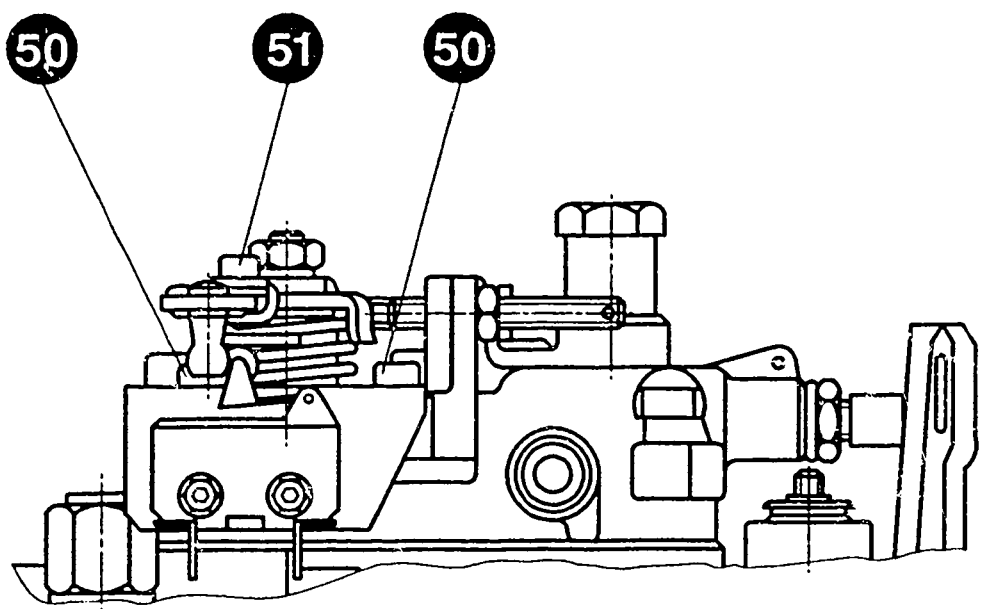


KMK02251

TIGHTENING TORQUES FOR PUMP WITH MICROSWITCH

50 = Torx bolt	7.0...10.0	Nm
51 = Torx bolt	3.0 5.0	Nm

Continue: B04/1 Fig.: B03/2

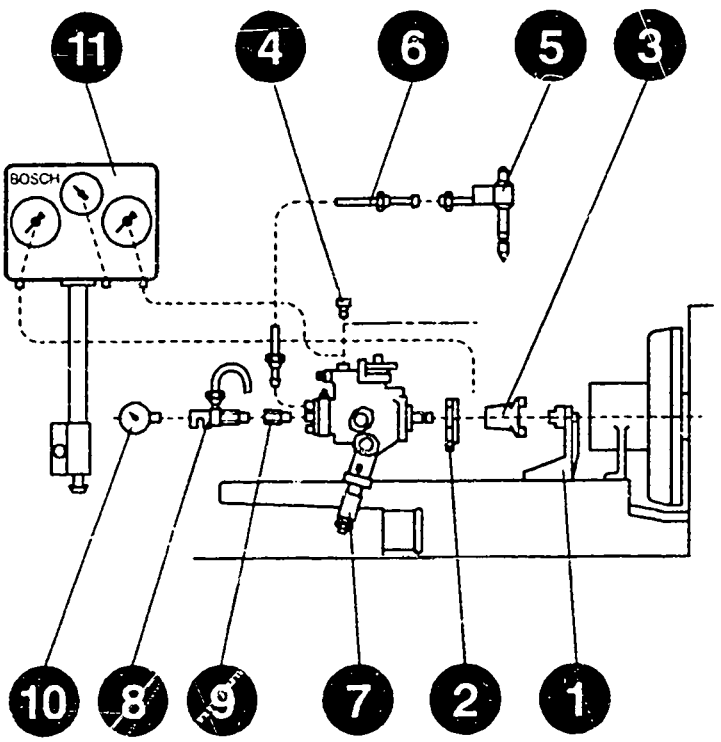


KMK02252

TEST SET-UP
 * Test-bench accessories

1 = Universal clamping bracket
2 = Clamping flange
3 = Coupling half
4 = Overflow restriction (as per
    service-parts list) or
    test-specification sheet
5 = Calibrating nozzle-holder assembly
6 = Test-pressure line
7 = Timing-device measuring instrument
8 = Prestroke measuring device
9 = Adapter
10= Dial indicator
11= Test device for inlet pressure
    and pump interior pressure
    (if necessary)

Continue: B05/1 Fig.: B04/2

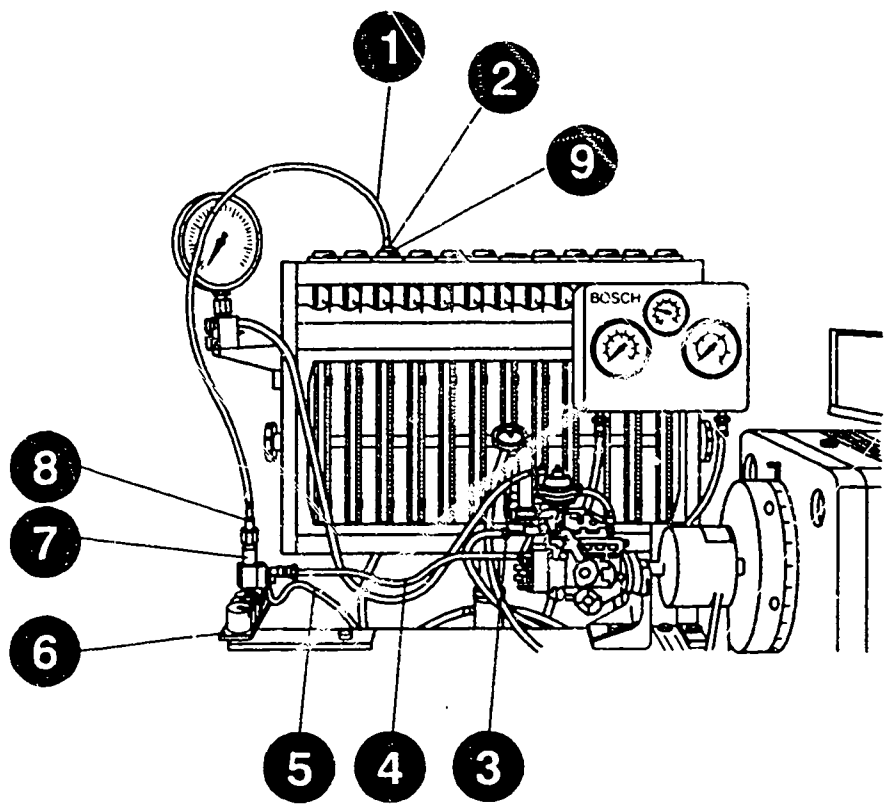


KMK02253

VE LINE DIAGRAM WITH ON-THE-ENGINE TEST EQUIPMENT

1 = Connecting line
2 = Reducer bushing (adapter with spray damper cap)
3 = Temperature indicator
4 = Test-pressure line
5 = Fuel return line
6 = Holding device for nozzle-holder assembly
7 = Calibrating nozzle-holder assembly
8 = Reduction collar
9 = Reduction sleeve (only use reduction sleeves with internal grooves)

Continue: B06/1 Fig.: B05/2

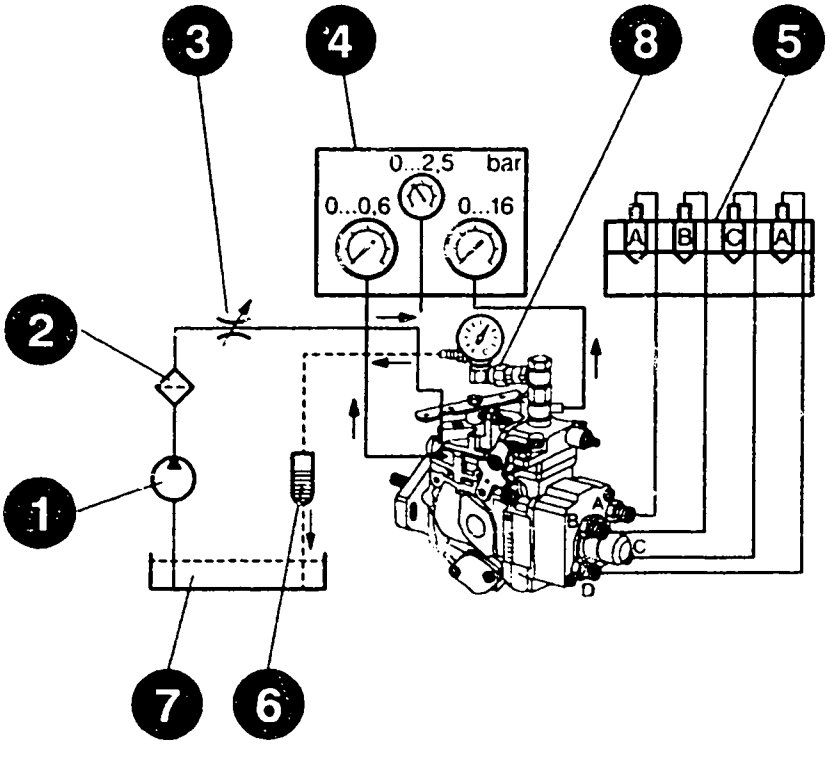


KMK02254

CONNECTION DIAGRAM

1 = Supply pump
2 = Filter
3 = Pressure regulator (inlet pressure)
4 = Test device with pressure gauge
0...0.6 bar (0.6 kPa) inlet pressure
0...2.5 bar (2.5 kPa) pressure
0...16 bar (16 kPa)
pump interior pressure
5 = Holder for nozzle-holder assembly
6 = Overflow graduate
7 = Calibrating-oil tank
8 = Temperature indicator with overflow restriction
9 = Calibrating-oil tank

Continue: C01/1 Fig.: B06/2



KMK02255

PREPARATION OF FUEL-INJECTION PUMP

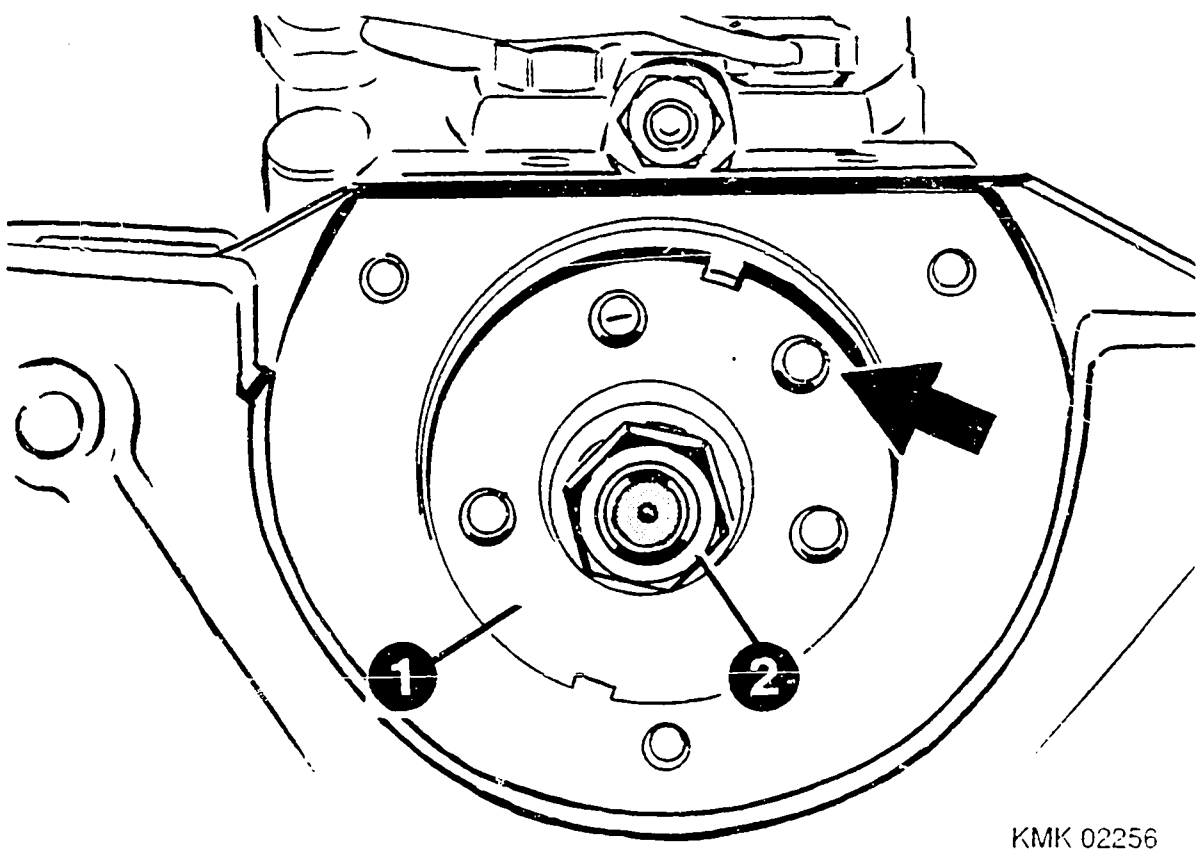
1 = Coupling half
2 = Securing nut

* Remove coupling half

If provided, remove coupling half,
loosen securing nut.

I M P O R T A N T
Do not counterhold at setting hole
(arrow).
Press off coupling half with
commercially available extractor.
Fit drive coupling and clamping flange.

Continue: C02/1 Fig.: C01/2



KMK 02256

CLAMPING FUEL-INJECTION PUMP IN POSITION

Attach pump to test bench with appropriate clamping bracket and clamping flange such that the no-play drive coupling is subjected to tensile stress.

Note:
Use is to be made of extra-long coupling in the case of pumps with load-dependent start of delivery.
Identification: Speed indicated in Section "Load-dependent start of delivery"

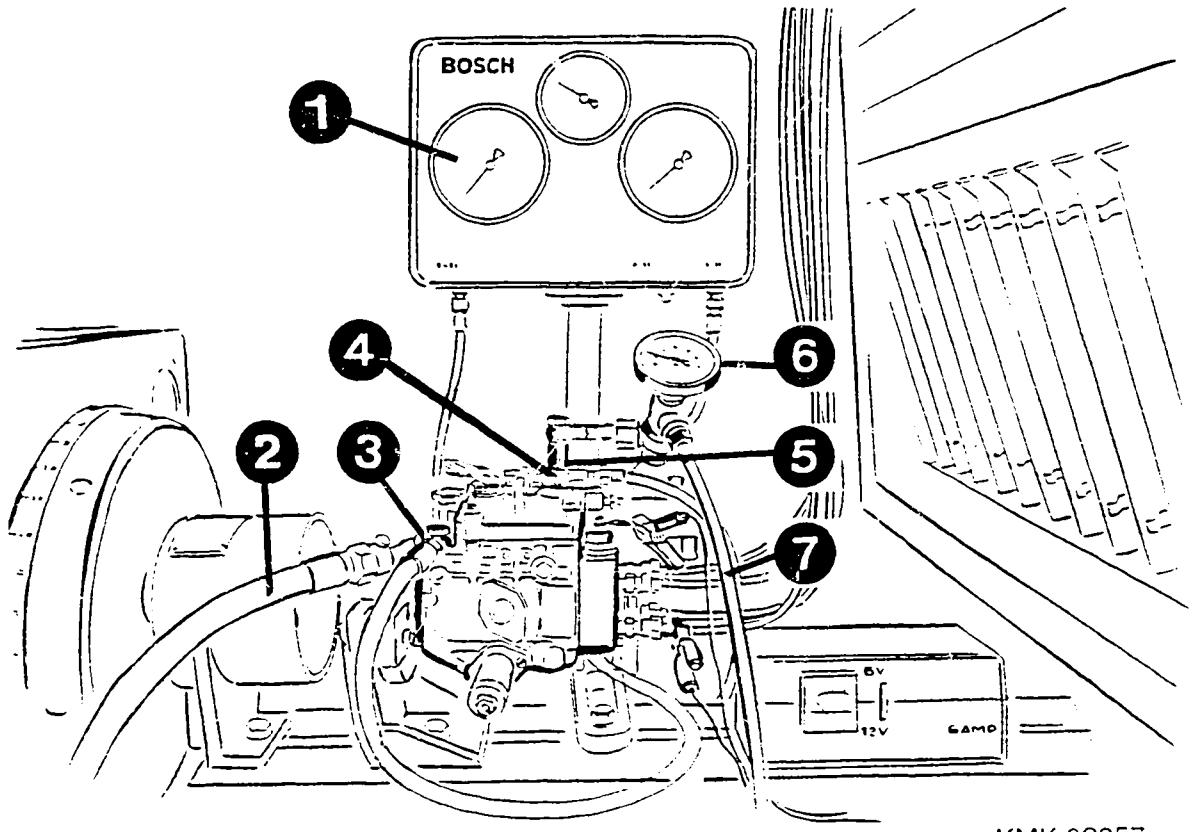
Continue: C03/1

CLAMPING FUEL-INJECTION PUMP IN POSITION

1 = Testing device
2 = Calibrating-oil inlet hose from test bench
3 = Connection, pump inlet

Attach testing device to test bench.
Install test-pressure lines and calibrating nozzle-holder assembly as per test-specification sheet.
Use connector 1 683 370 011 (set of parts for testing device) to attach calibrating-oil inlet hose at distributor pump to pump inlet connection.
Attach connecting line for pressure gauge 0..0.6 bar to pump inlet for inlet pressure measurement.

Continue: C04/1 Fig.: C03/2



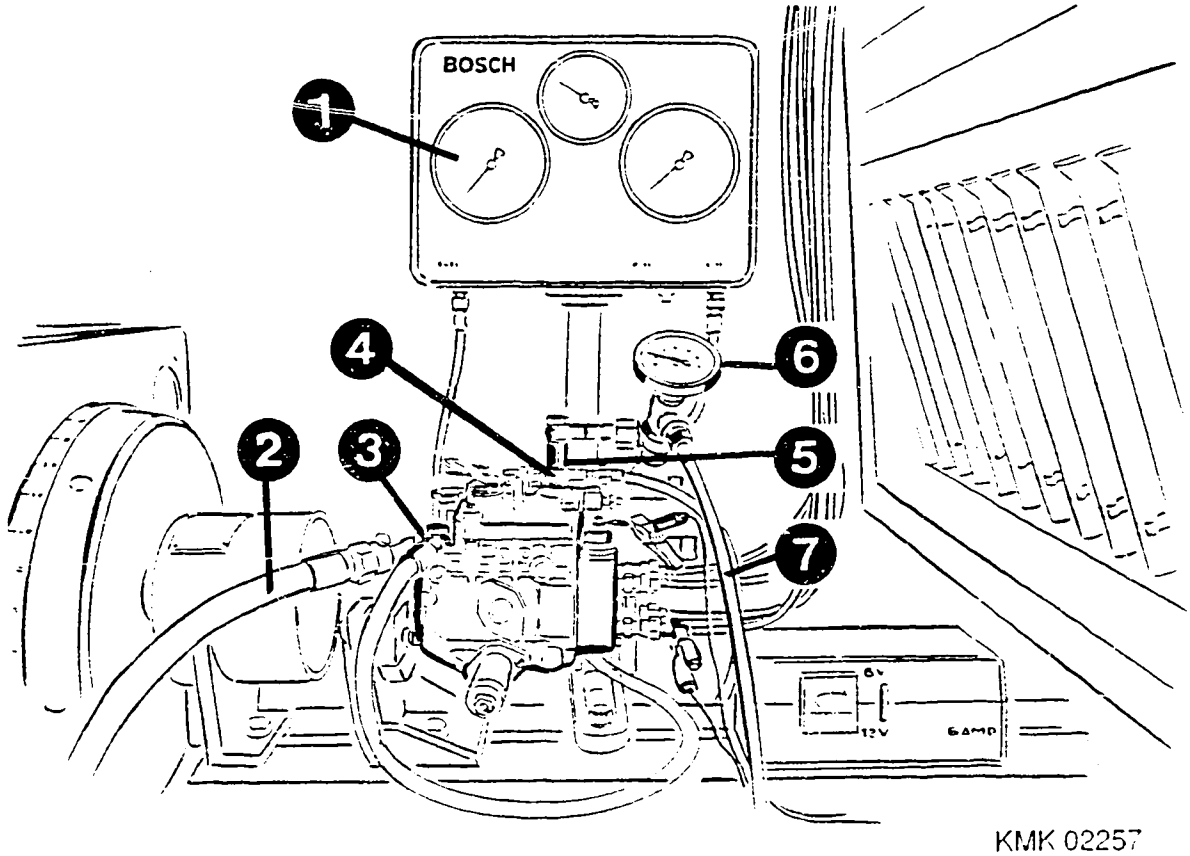
KMK 02257

CLAMPING FUEL-INJECTION PUMP IN POSITION

4 = Overflow restriction
5 = Connection for supply pump pressure measurement

Attach connecting line for pressure gauge 0...16 bar to outlet upstream of overflow restriction for measurement of supply pump pressure.
To do so, make use of reducer bushing 1 683 456 000 and inlet union.

Continue: C05/1 Fig.: C04/2



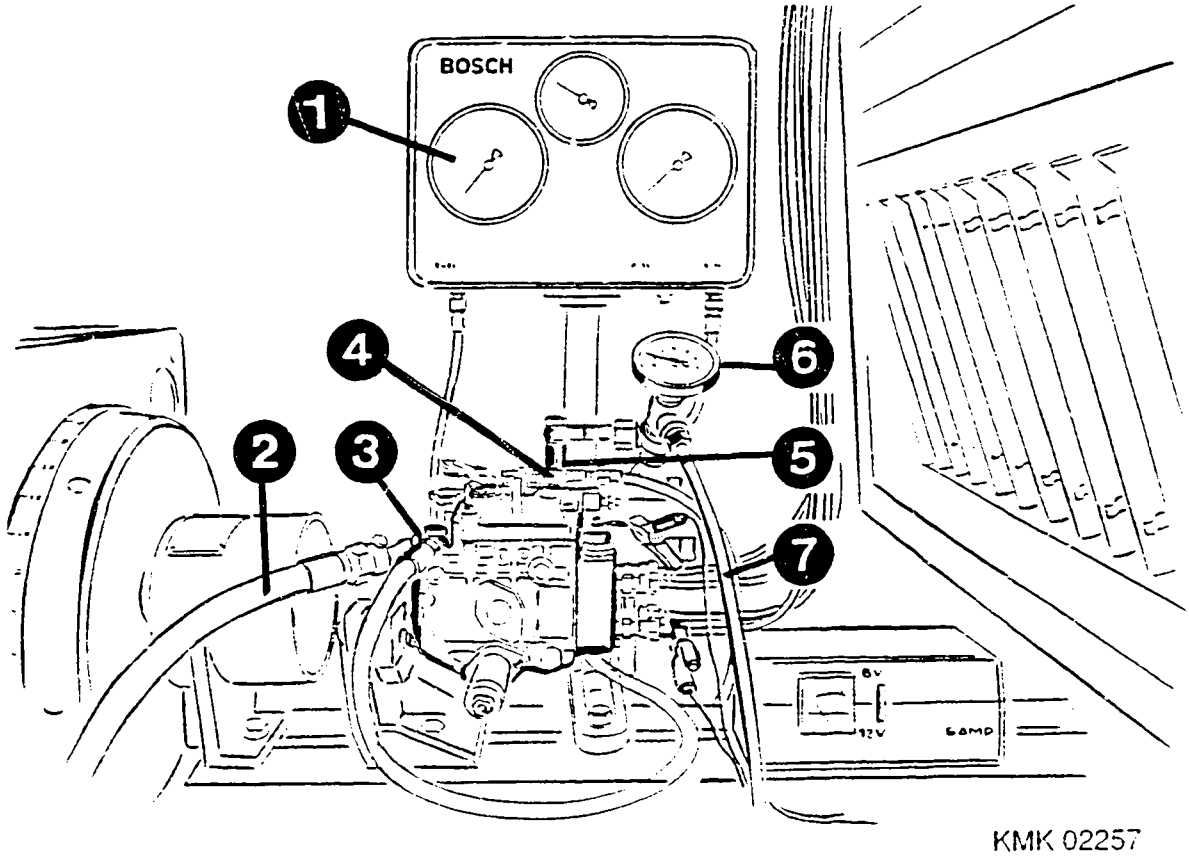
KMK 02257

CLAMPING FUEL-INJECTION PUMP IN POSITION

6 = Temperature indicator
7 = Return line

Connect temperature indicator with overflow restriction to pump return. Route overflow back into calibrating-oil tank with plastic hose.

Continue: C06/1 Fig.: C05/2

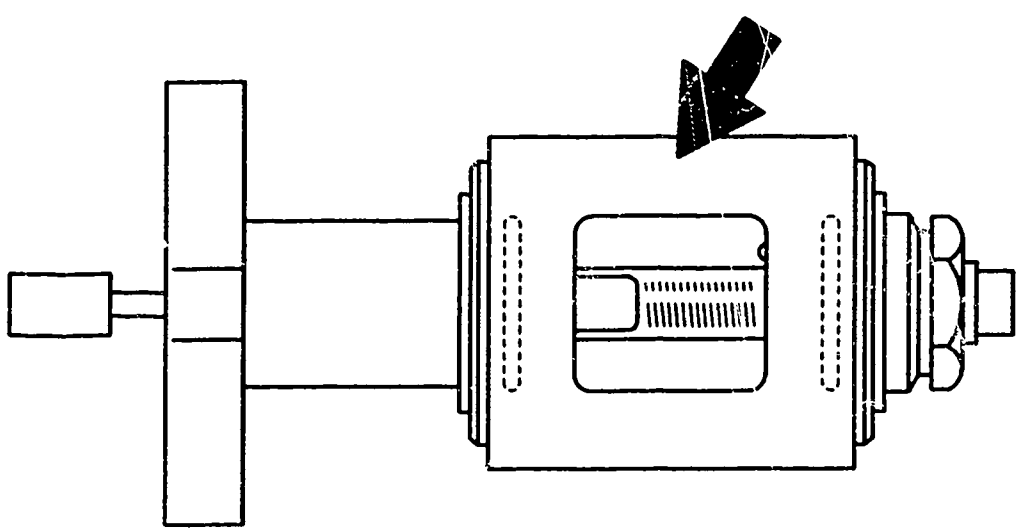


ATTACHMENT OF TIMING-DEVICE MEASURING INSTRUMENT

Arrow = Aluminium casing

Unscrew cover.
Attach measuring device (heavy duty version with aluminium casing) to delivery end with O-ring.

Continue: C07/1 Fig.: C06/2



KMK02353

HEATING FUEL-INJECTION PUMP

In the case of pumps with electr. shutoff, the solenoid (pulling electromagnet) must be switched on with the "test voltage" indicated in the test-specification sheet.

No voltage is to be applied in the case of pumps with pushing electromagnet (can be seen from test-specification sheet).
Cylindrical helical coiled spring at control lever.
Pretension governor spring by positioning control lever against rated-speed adjustment screw (adjustment of full-load speed regulation).

Continue: C07/2

HEATING FUEL-INJECTION PUMP

Set fuel inlet pressure of 0.30...0.40 bar at test-bench restriction and drive pump at rated speed until overflow temperature has been reached.

Return temperature with:

Thermometer	40°C...48°C
Electronic indicator	42°C...50°C

* Pay attention to data given in test-specification sheet.

Continue: C08/1

HEATING FUEL-INJECTION PUMP
* Return-temperature measurement with thermometer

Regulate inlet temperature by opening or closing heating restrictor in injection-pump test bench.
There must be pump delivery.
No delivery - screw in full-load screw.
Perm. tank temperature during entire measurement approx. 35°C.

Continue: C08/2

HEATING FUEL-INJECTION PUMP
* Return-temperature measurement with thermometer

If the overflow temperature 40°C...48°C is overshot/undershot during the delivery measurement, pump and calibrating oil must be briefly cooled to below the rated pump speed without delivery measurement or heated at rated speed.

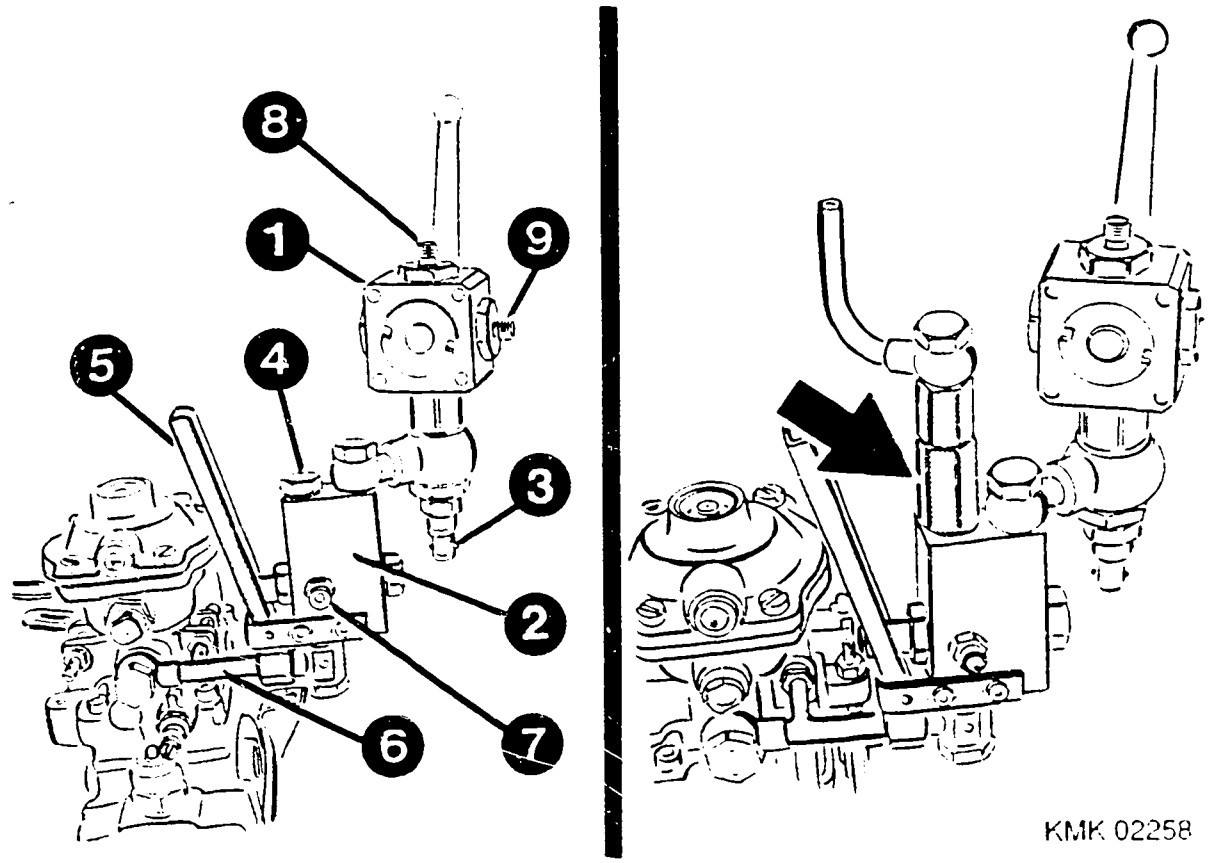
* Pay attention to overflow temperature in test-specification sheet.

Continue: C09/1

HEATING FUEL-INJECTION PUMP
* With electronic indicator
Connection diagram

1 = Multi-way cock
2 = Flushing valve
3 = Connection, temperature sensor
4 = Overflow restriction
When using a threaded connector with restriction, screw adaptor into body of flushing valve (arrow).
5 = Hand lever
6 = Connection piece at calibrating-oil return
7 = Supply pump delivery connection
8 = Return with overflow measurement
9 = Return with no overflow measurement

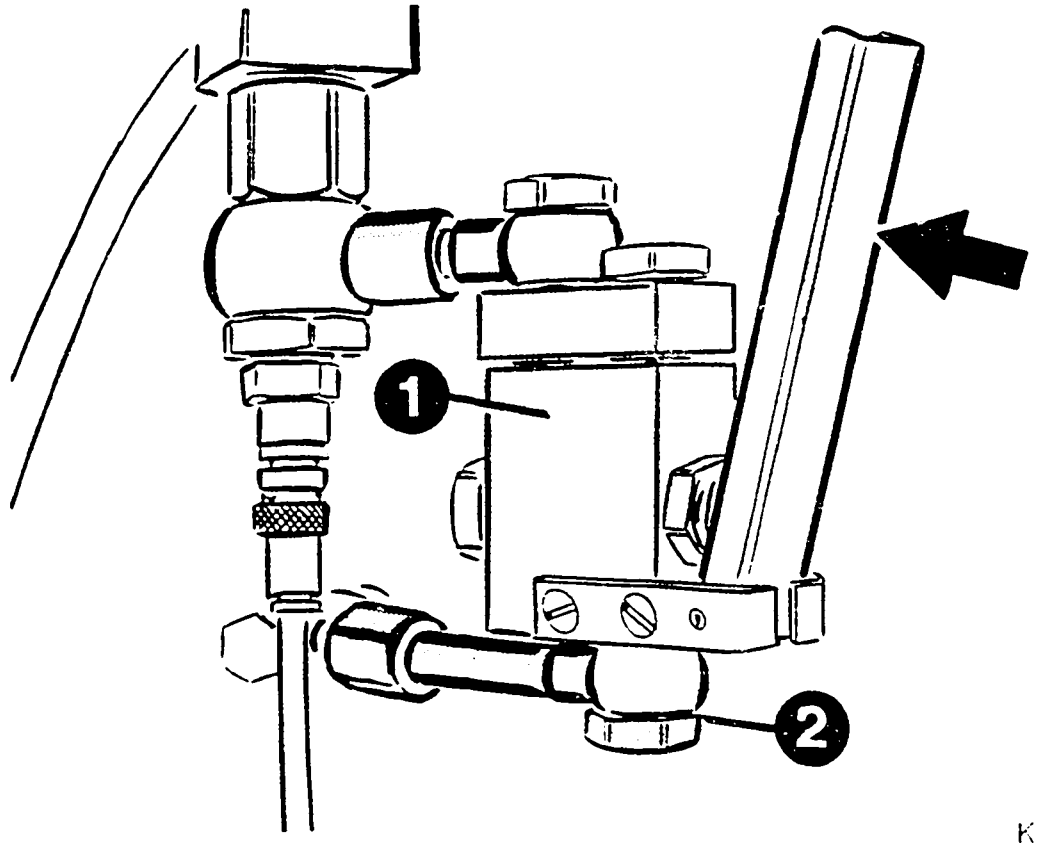
Continue: C10/1 Fig.: C09/2



HEATING FUEL-INJECTION PUMP
 * With electronic indicator
1 = Flushing valve
2 = Overflow restriction

In order to shorten the cooling-down times, use is made of a flushing valve when employing an electronic indicator.
 * Mode of operation:
Pressing the hand lever (arrow) causes the built-in overflow restriction to be bypassed.
As a result, more calibrating oil flows through the pump. This results in quicker cooling.
Flushing valve must not be pressed during measurement.

Continue: C11/1 Fig.: C10/2



KMK 02259

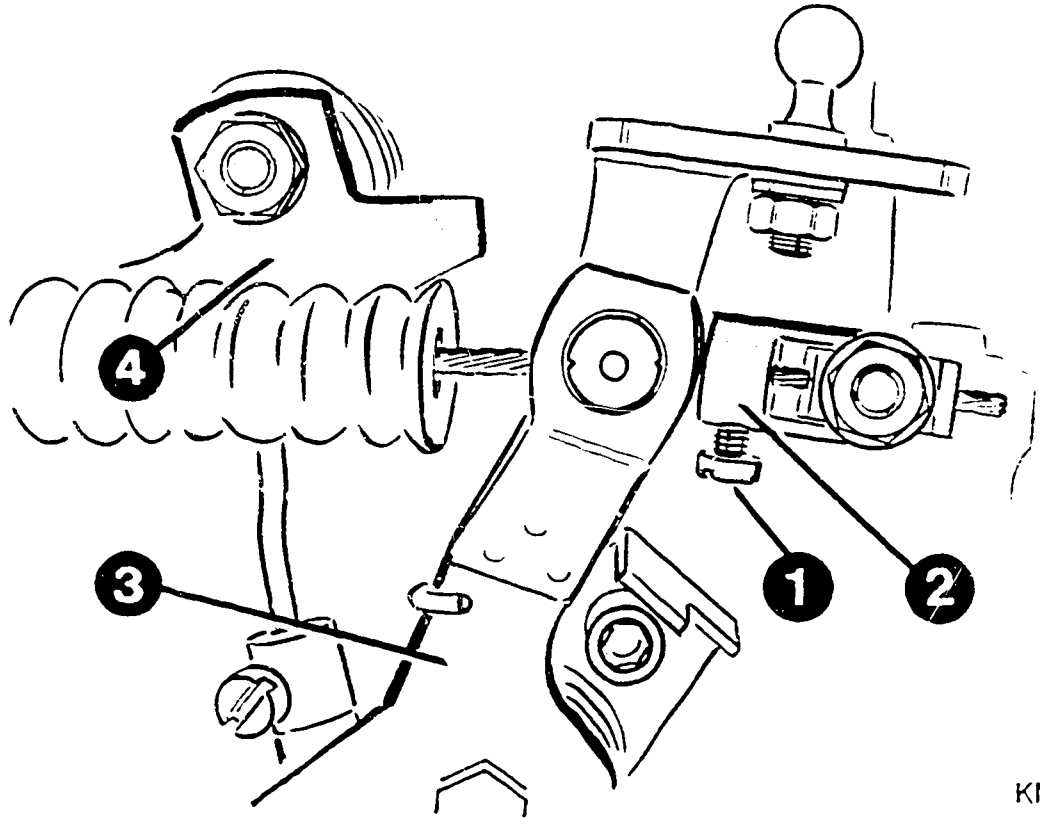
INITIAL PUMP INSPECTION
Prerequisite:
* Deactivate KSB function if appropriate

1 = Clamping screw
2 = Adaptor
3 = Control lever
4 = Regulating lever

Deactivate function of control device, cam roller ring, KSB:

Loosen clamping screw.
Pull adaptor with control lever in direction of distributor head.

Continue: C12/1 Fig.: C11/2

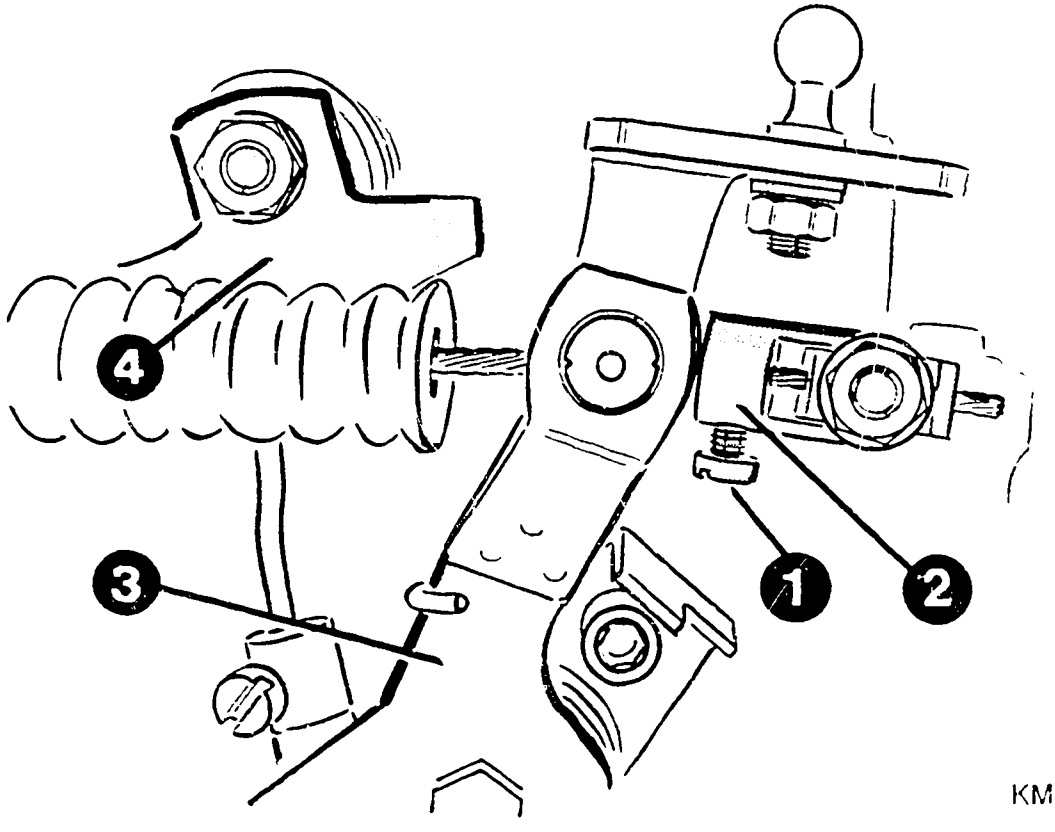


KMK 02260

INITIAL PUMP INSPECTION
Prerequisite:
* Deactivate KSB function if appropriate

1 = Clamping screw
2 = Adaptor
3 = Control lever
4 = Regulating lever
Turn adaptor through 90° and push in direction of drive shaft again until control lever makes contact with stop bracket.
The control device is deactivated in this position.
Disengage linkage of regulating lever from control lever.

Continue: C13/1 Fig.: C12/2

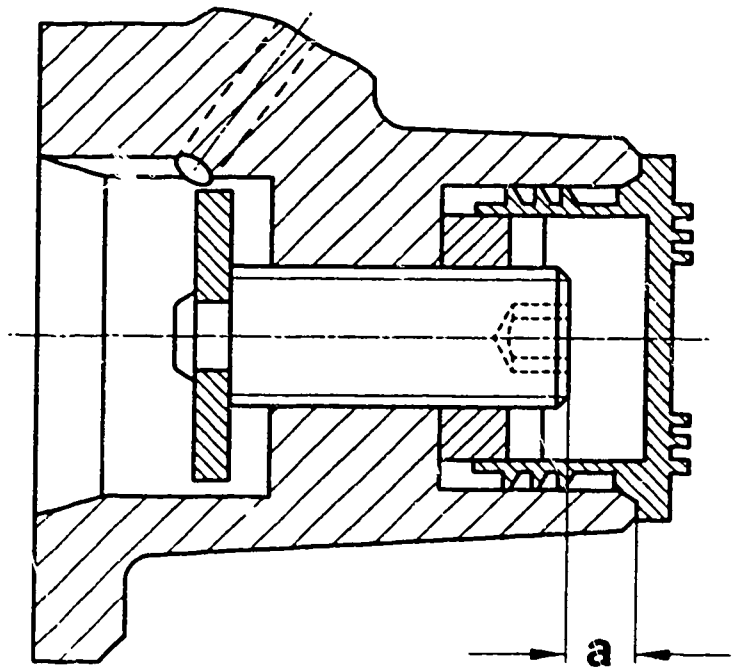


KMK 02260

INITIAL PUMP INSPECTION
Prerequisite:
* Checking of timing-device pretensioning

If timing device is provided with adjusting screw accessible from outside, check basic setting of timing-device spring pretension (dimension "a").
Dimension "a" = 3.3 +/- 0.1 mm
Note:
Spring pretension may possibly have been adjusted with this version on engine (max. 1.0 mm).
Total screw-in depth of adjusting screw may be 4.3 +/- 0.1 mm.
Establish basic setting "a"= 3.3 +/- 0.1 mm.

Continue: C14/1 Fig.: C13/2



KMK02261

INITIAL PUMP INSPECTION

Initial inspection on the test bench is performed in the same sequence as the test sequence.

As regards the initial inspection, the VALUES IN BRACKETS on the test-specification sheet apply (observe quantity scatter).
Enter values determined in test record.
If the values have to be corrected, the test specifications NOT IN BRACKETS apply.

Continue: C14/2

NOTE:
The supply pump pressure is of secondary importance as regards functional assessment.
Delivery and timing-device travel are the crucial variables and must be within the prescribed tolerance.
Check values (values in parentheses) for the supply pump pressure are invalid.
As regards warranty tests, all check measurements envisaged in the test-specification sheet are to be performed with the exception of the check value for the supply pump pressure.

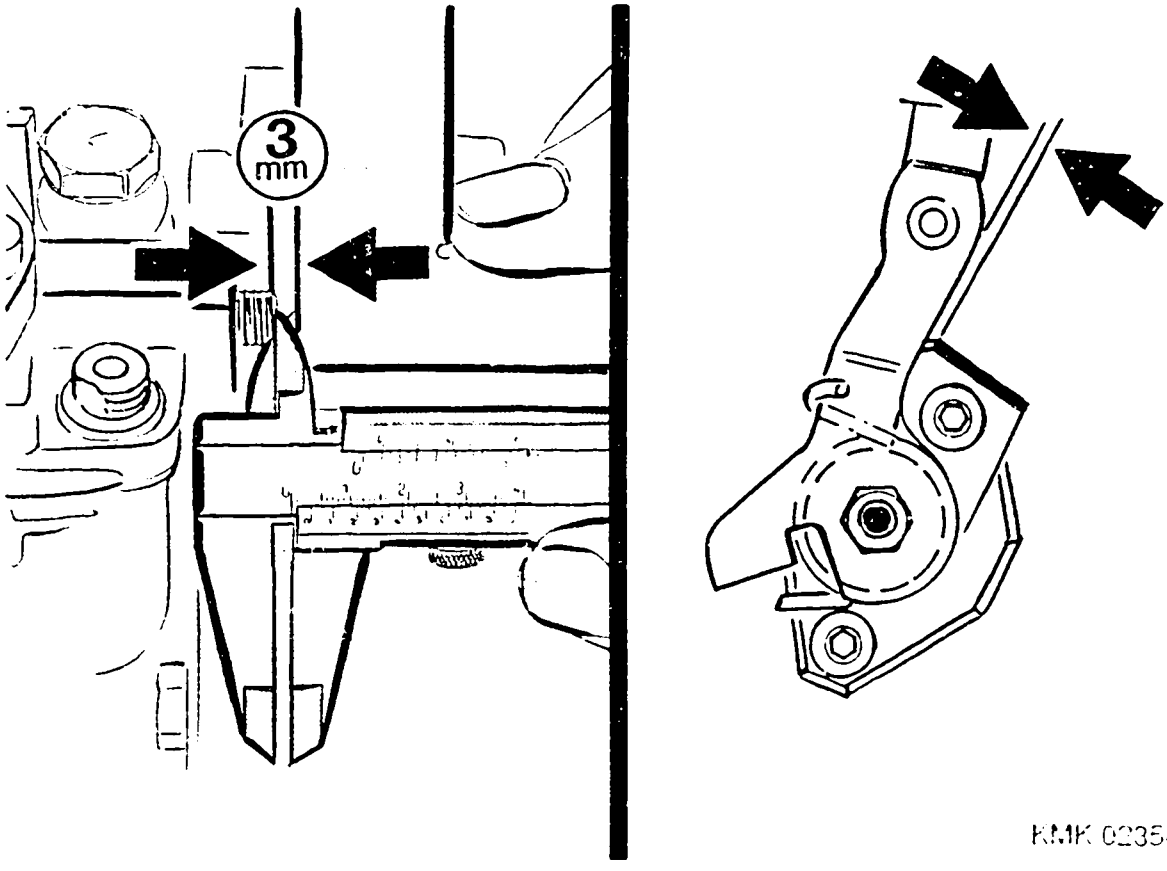
Continue: C15/1

PREPARATION OF FUEL-INJECTION PUMP FOR ADJUSTMENT

* Prerequisite:
- Governor shaft statically preset on pumps with and without load-dependent start of delivery (LFB).
  Without LFB approx. 3.0 mm
  With LFB approx. 1.5 mm

- Stop bracket of temperature-dependent cold-start acceleration device (KSB) set to spacing dimension.
  Spacing dimension 0.5 + 0.2 prior to start of stroke

Continue: C16/1 Fig.: C15/2

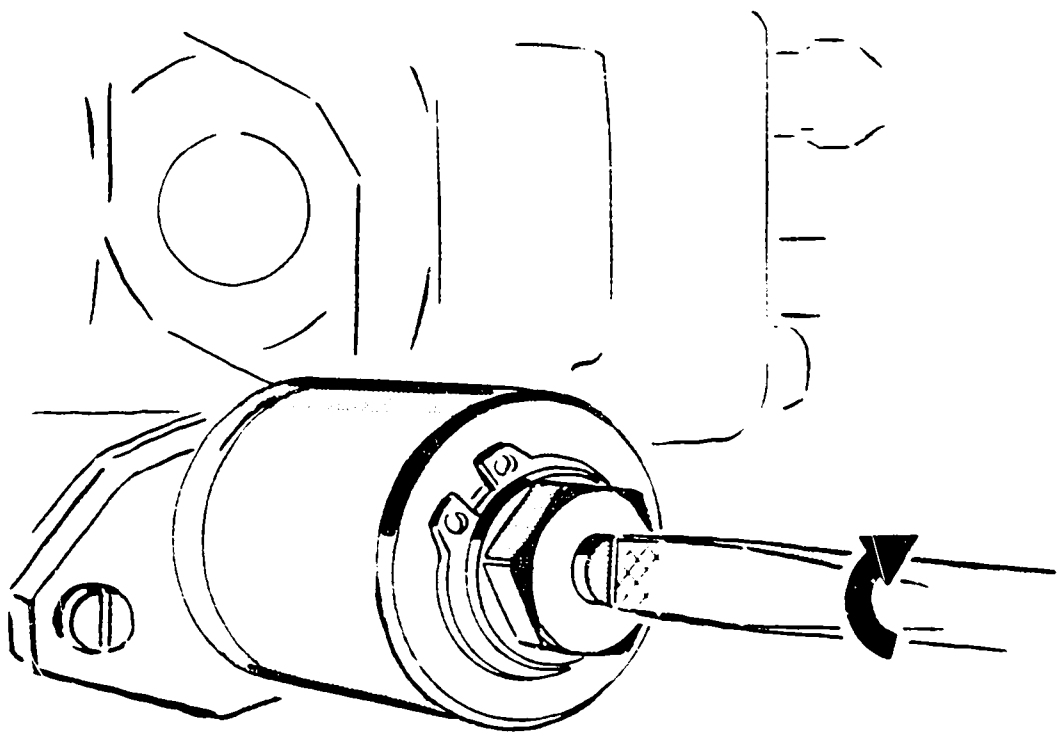


ADJUSTING FUEL-INJECTION PUMP

* ADJUSTING SUPPLY PUMP PRESSURE AND TIMING-DEVICE TRAVEL

Position control lever against rated-speed adjusting screw.
If necessary, vent timing-device measuring instrument at end face (see picture). The setting for the supply pump pressure and timing-device travel must be attained at the speed given in the test-specification sheet.

Continue: C17/1 Fig.: C16/2



KMK 02262

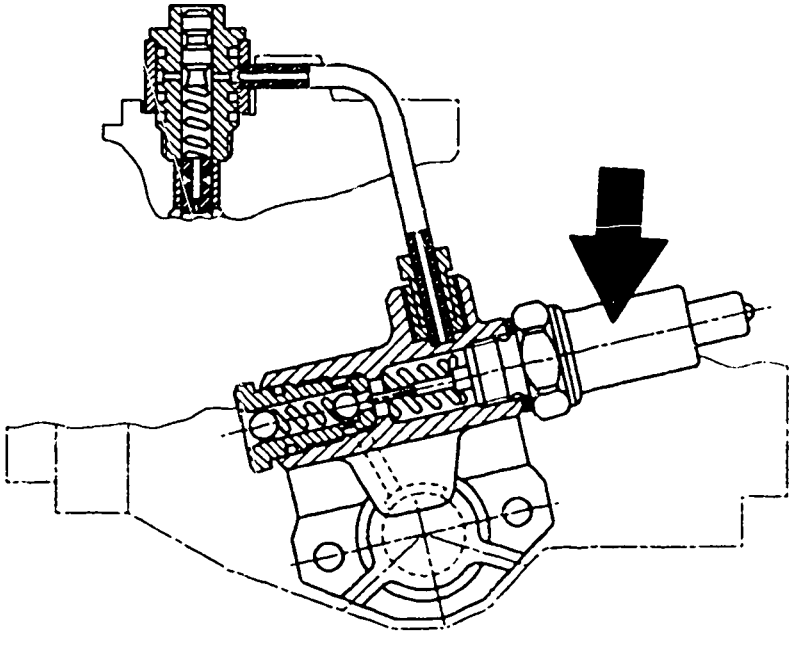
ADJUSTING SUPPLY PUMP PRESSURE AND TIMING-DEVICE TRAVEL

Arrow = Solenoid valve

If a hydraulic KSB or a frequency valve is fitted, apply voltage to frequency valve or solenoid valve (expansion element).

* Refer to test-specification sheet for voltage value.

Continue: C18/1 Fig.: C17/2



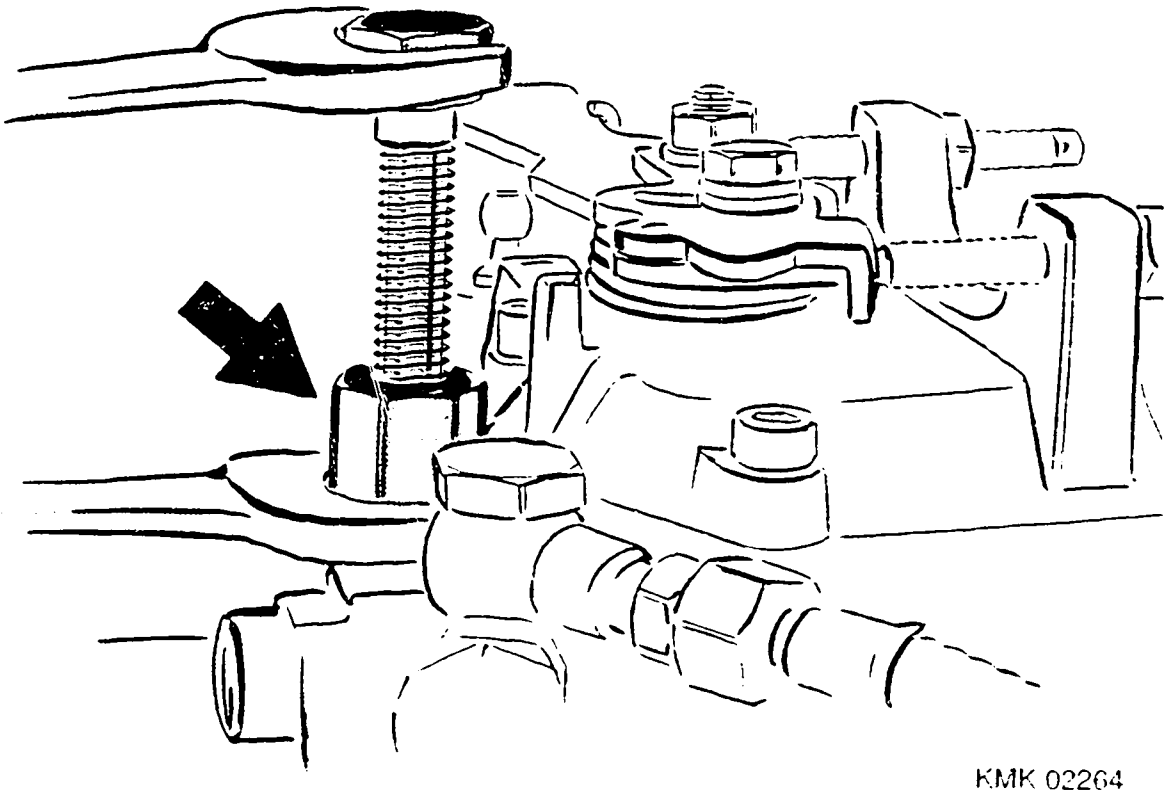
KMK02263

ADJUSTING SUPPLY PUMP PRESSURE

NOTE:
Before adjusting supply pump pressure, preset full-load delivery to approx. 3 - 4 ccm.
If presetting is not made, supply pump pressure and timing-device travel may be subject to change after full-load adjustment.

Slip pressing-in tool KDEP 1092 onto pressure regulator and turn through 90°.
Press plug into pressure regulator by screwing it in.
Counterhold pressing-in tool (arrow).

Continue: C19/1 Fig.: C18/2



KMK 02264

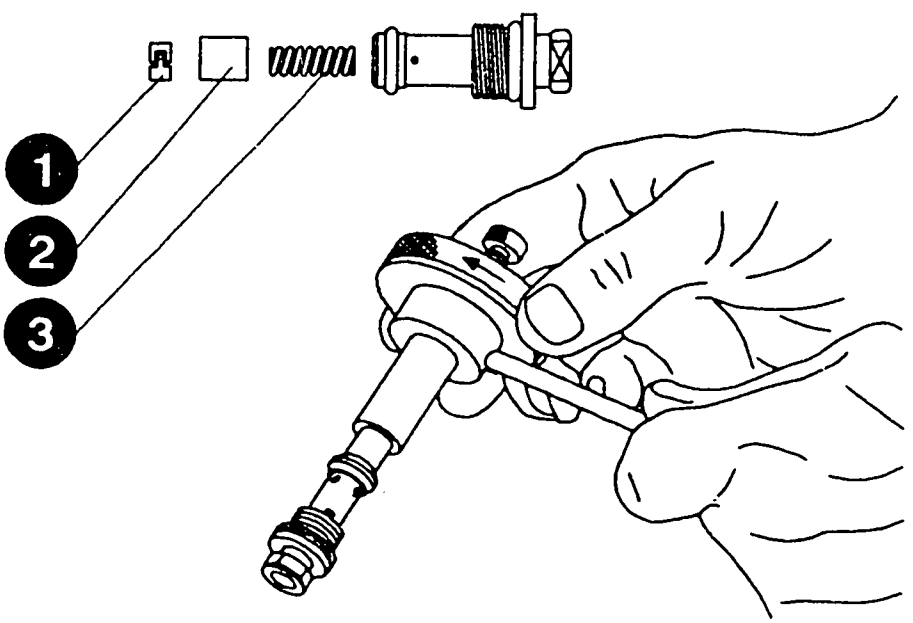
ADJUSTING SUPPLY PUMP PRESSURE

1 = Clamping sleeve
2 = Piston
3 = Pressure spring

This increases the supply pump pressure and "advances" the timing device.
If the supply pump pressure is too high, remove pressure regulator with socket wrench KDEP 1086.

Remove clamping sleeve with puller KDEP 1027.
Remove piston and pressure spring.

Continue: C20/1 Fig.: C19/2



KMK02265

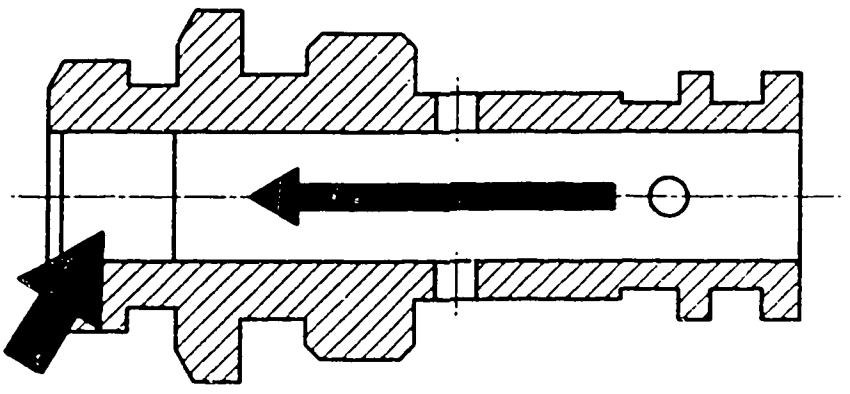
ADJUSTING SUPPLY PUMP PRESSURE

Arrow = Plug

Press out plug.

Then re-install pressure spring and piston in pressure regulator.

Continue: C21/1 Fig.: C20/2



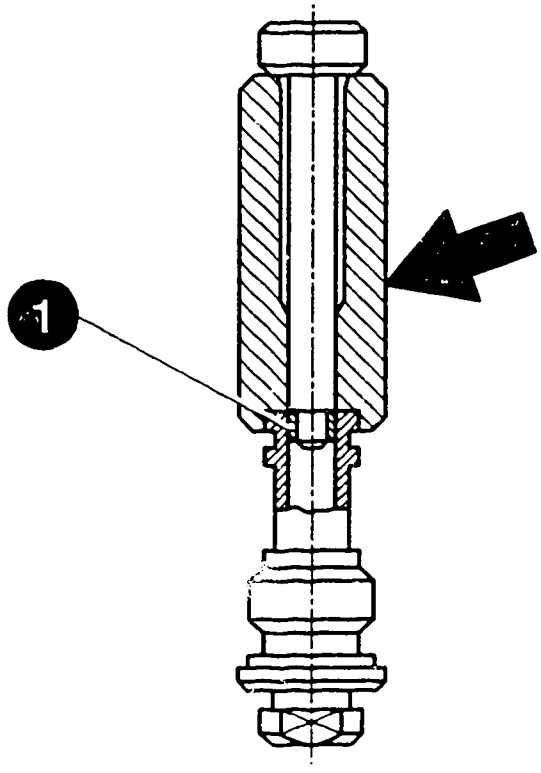
KMK02266

ADJUSTING SUPPLY PUMP PRESSURE

Arrow = Clamping sleeve

Press in new clamping sleeve with pressing-in tool KDEP 1093 (arrow) such that it is flat. Install pressure regulator and tighten to tightening torque of 7...10 Nm. Repeat adjustment of supply pump pressure.
If supply pump pressure is not attained, eliminate cause in accordance with repair instructions.

Continue: C22/1 Fig.: C21/2



KMK02267

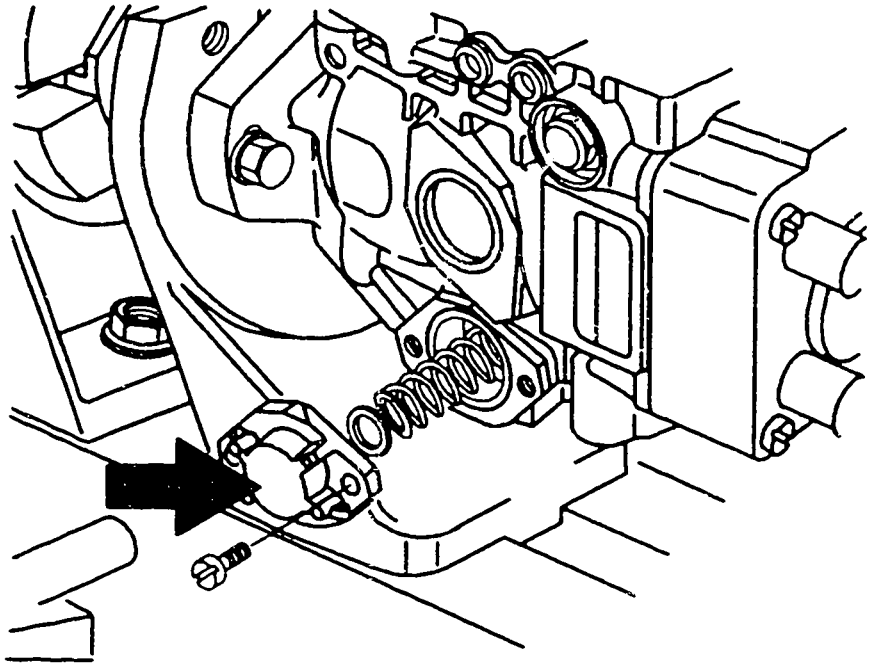
ADJUSTING TIMING-DEVICE TRAVEL

Arrow = Timing-device cover

If the prescribed timing-device travel is not attained with utilization of the tolerance for the supply pump pressure, check timing-device shims.

Timing-device cover (spring end).

Continue: C23/1 Fig.: C22/2



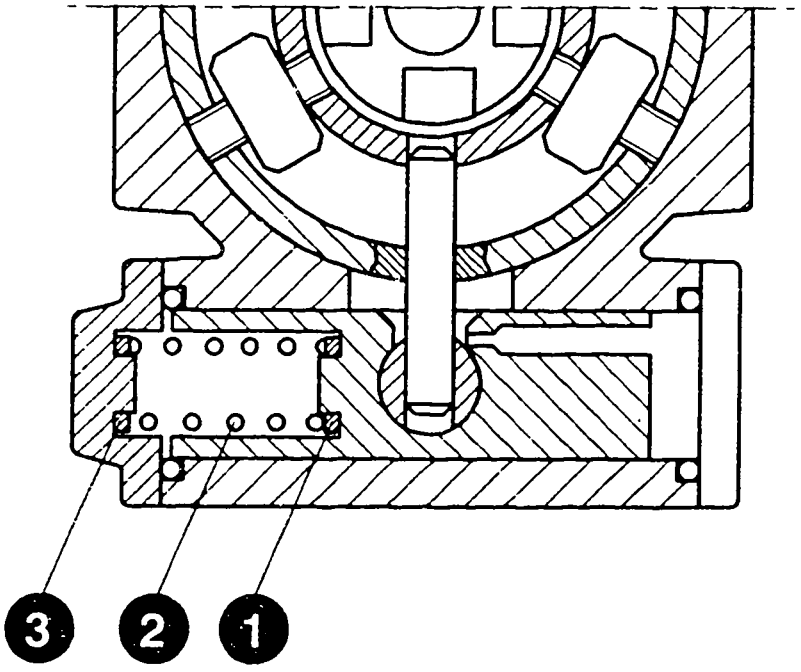
KMK02268

ADJUSTING TIMING-DEVICE TRAVEL

1 = Shim
2 = Pressure spring
3 = Timing-device shims

Measure thickness of shims made up of items 1 and 3.
Likewise make allowance for shim 1 and compare to dimension "SVS" as per test-specification sheet.
Insert approx. 0.6 mm thick shim in timing-device piston.
Fit pressure spring.

Continue: C24/1 Fig.: C23/2



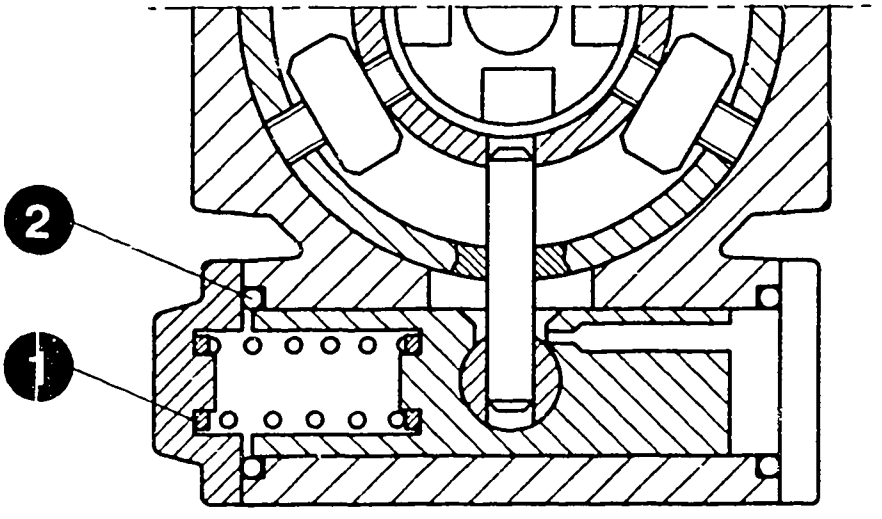
KMK02269

ADJUSTING TIMING-DEVICE TRAVEL

1 = Timing-device shims
2 = Sealing ring

Insert sealing ring and fit cover with remaining shims (which produce dimension "SVS").
NOTE:
There must be at least 1 shim on either side of pressure spring.
Repeat measurement of timing-device travel.
If timing-device travel is not attained despite correction of shims - check freedom of movement of timing-device piston as per repair instructions.

Continue: C25/1 Fig.: C24/2



KMK02358

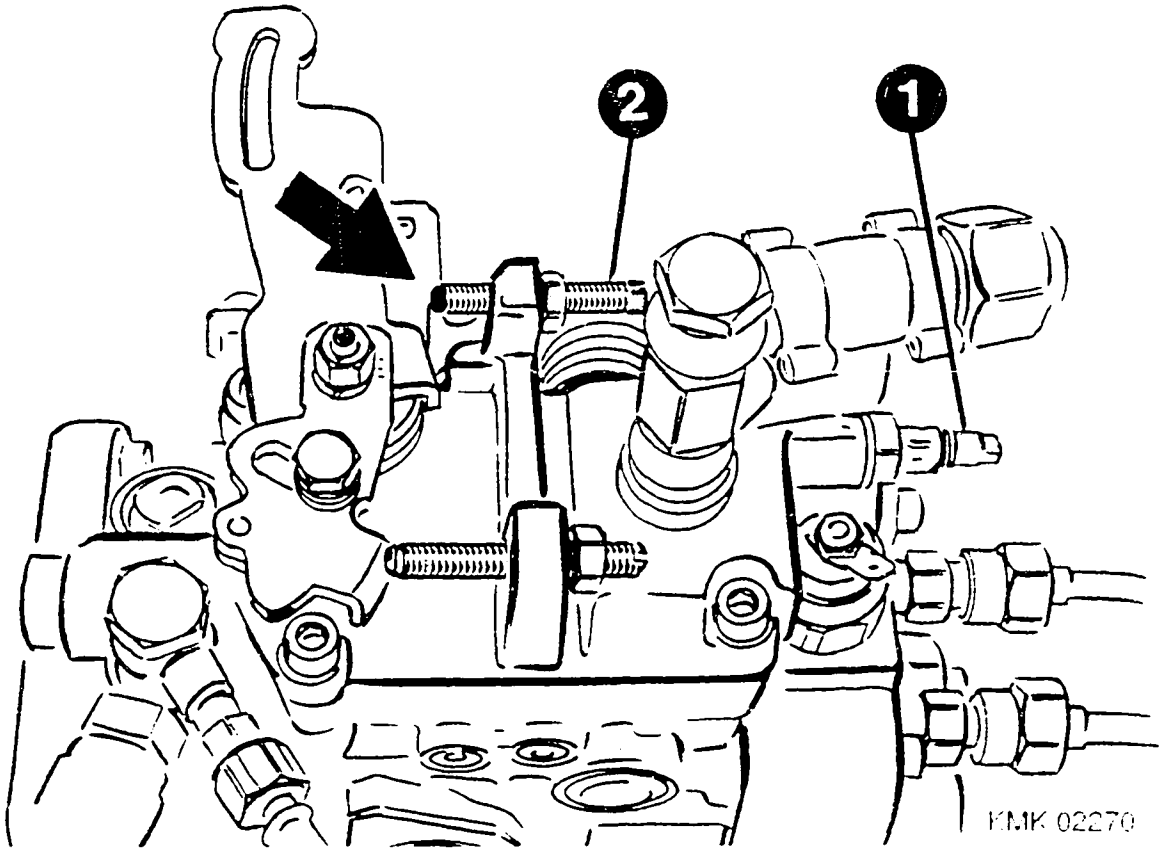
ADJUSTING FULL-LOAD DELIVERY

1 = Full-load adjusting screw
2 = Rated-speed adjusting screw

Pretension governor spring by positioning control lever against rated-speed adjusting screw.

Set delivery by turning full-load adjusting screw at stated speed.
In doing so, O-ring of full-load adjusting screw must not emerge from hole.
If necessary, use shorter adjusting screw.

Continue: C26/1 Fig.: C25/2



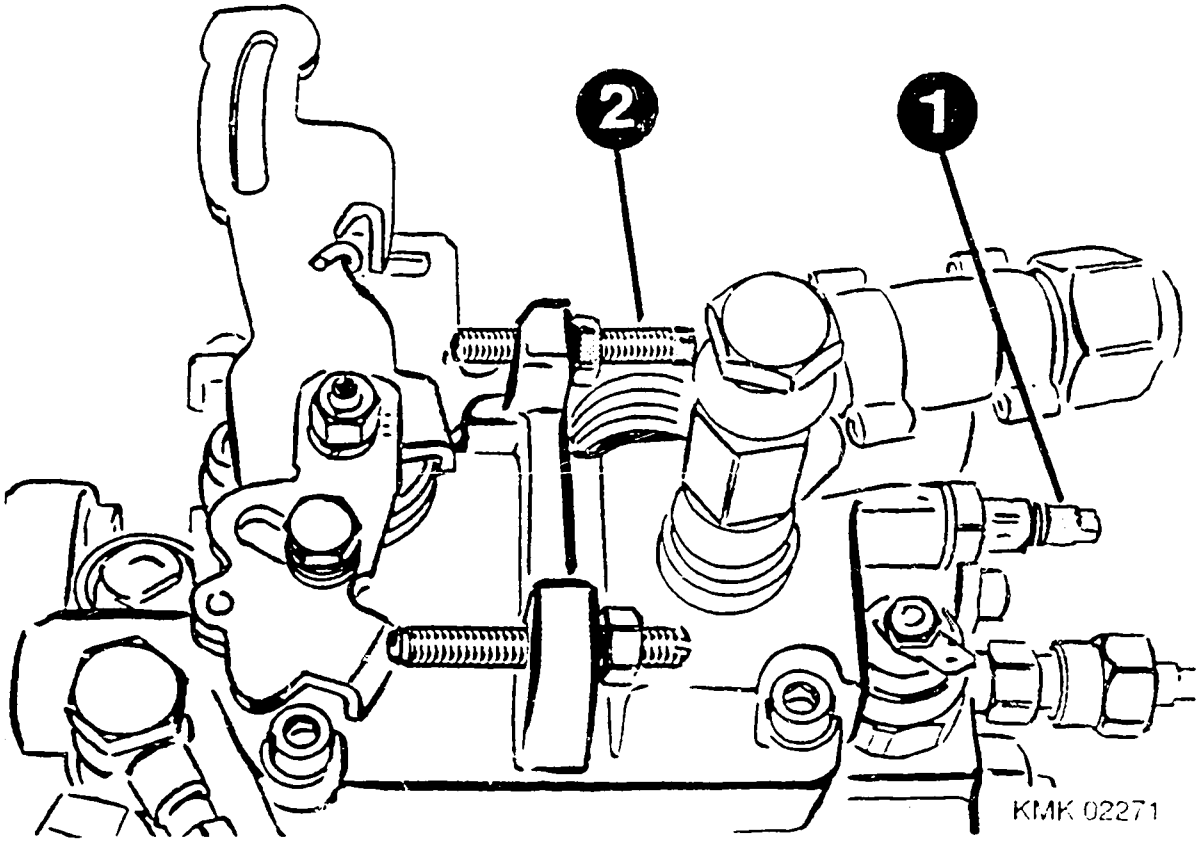
ADJUSTING FULL-LOAD DELIVERY

1 = Full-load adjusting screw
2 = Rated-speed adjusting screw

Turn back rated-speed adjusting screw by 2 turns.
This must not influence full-load delivery.
If full-load delivery is too low, adjust by way of adjusting screw.

If full load cannot be adjusted
- eliminate cause in line with repair instructions.

Continue: C27/1 Fig.: C26/2



ADJUSTING LOW-IDLE SPEED REGULATION

Select adjustment sequence in line with the following features:

If new control lever was fitted, adjust control-lever position

2-piece control lever
refer to Coordinate H08/1

1-piece control lever
refer to Coordinate H16/1

Continue: C28/1

ADJUSTING LOW-IDLE SPEED REGULATION

I M P O R T A N T
Before adjusting low-idle speed regulation, check whether "load-dependent start of delivery" section in test-specification sheet not only indicates speed but also
- quantity difference
- timing-device-travel distance
- supply pump pressure difference.
If differences are given, adjust LFB on pumps with "housing-fixed idle spring" prior to low-idle speed regulation.

Continue: C28/2

ADJUSTING LOW-IDLE SPEED REGULATION

Select further adjustment in accordance with following additional functions:

* Pump with no housing-fixed idle spring Coordinate D01/1

* Pump with housing-fixed idle spring Coordinate D02/1

* Pump with housing-fixed idle spring and difference data in "load-dependent start of delivery" section Coordinate D10/1

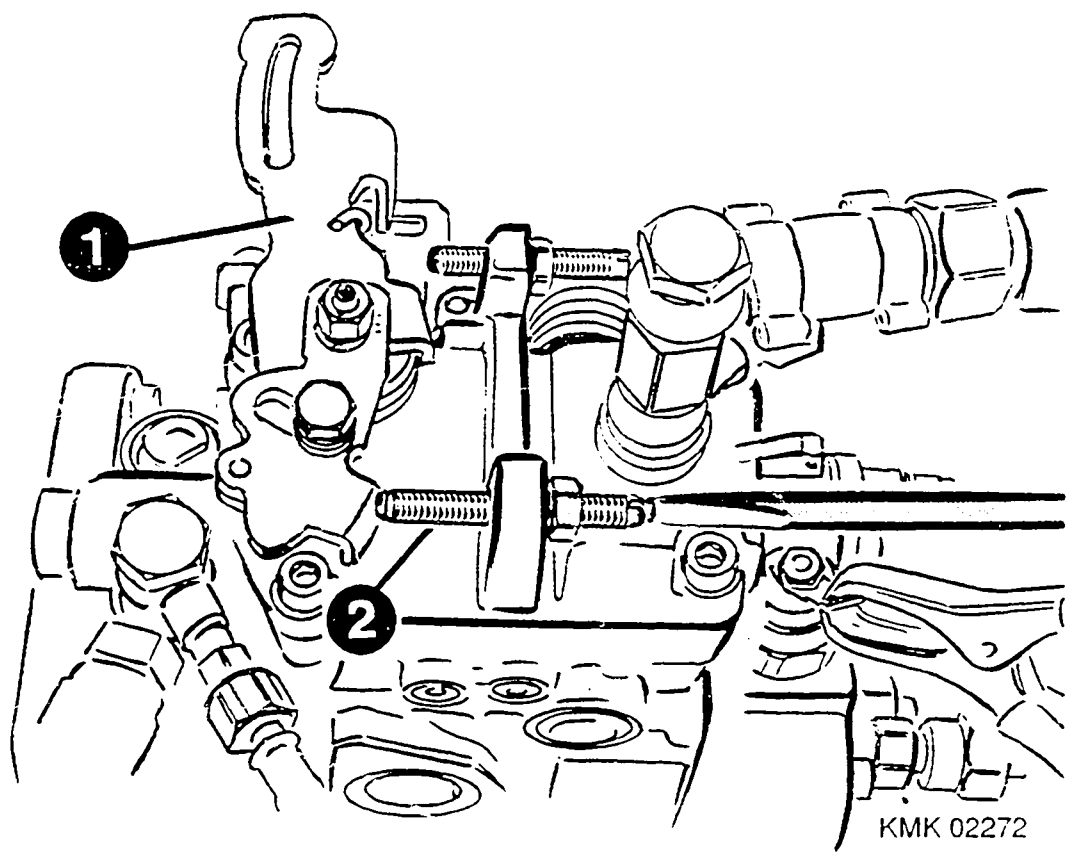
Continue: D01/1

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump without LFG

1 = Speed control lever
2 = Idle adjusting screw

Position control lever at idle adjusting screw.
Set prescribed idle quantity with adjusting screw at stated speed.

Continue: D06/1 Fig.: D01/2



ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Note:
Non-EDP test-specification sheets do NOT indicate the idle quantity under low-idle speed regulation, but rather the residual quantity which must be set prior to idle adjustment.

Terms are marked with letters A – C.
A = Residual quantity adjustment
B = Idle quantity adjustment
C = High idle quantity

Continue: D02/2

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

N O T E :
LFB attachment, right (viewed towards drive)
Idle adjusting screw at LFG lever "left".

LFB attachment, left
Idle adjusting screw at LFG lever "right".

Continue: D03/1

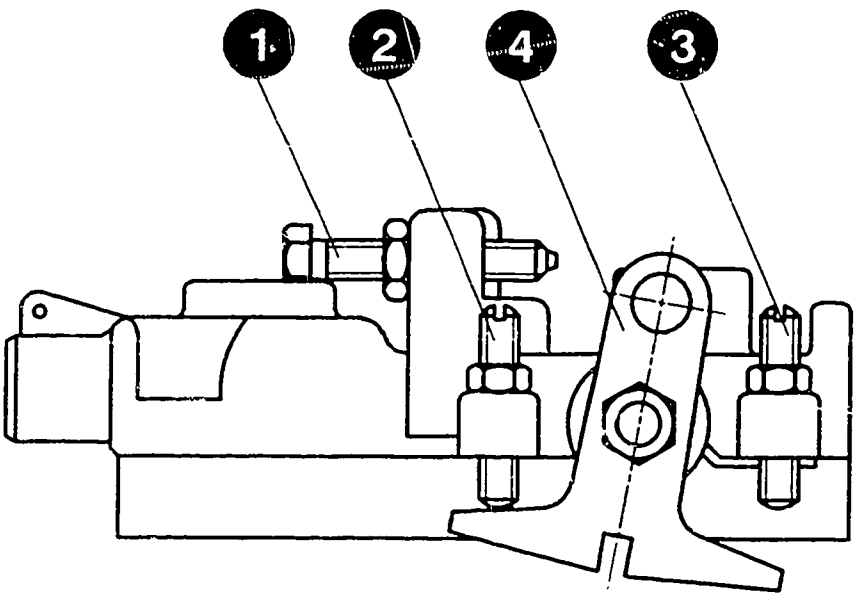
ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Adjusting residual quantity

1 = Residual-quantity adjusting screw
2 = Adjusting screw, low idle
3 = Adjusting screw, high idle
4 = LFG stop lever

Screw out both idle adjusting screws.
Adjust speed as per test-specification sheet.
Measure delivery.
Adjust delivery to center of tolerance by way of residual-quantity adjusting screw.

Continue: D04/1 Fig.: D03/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

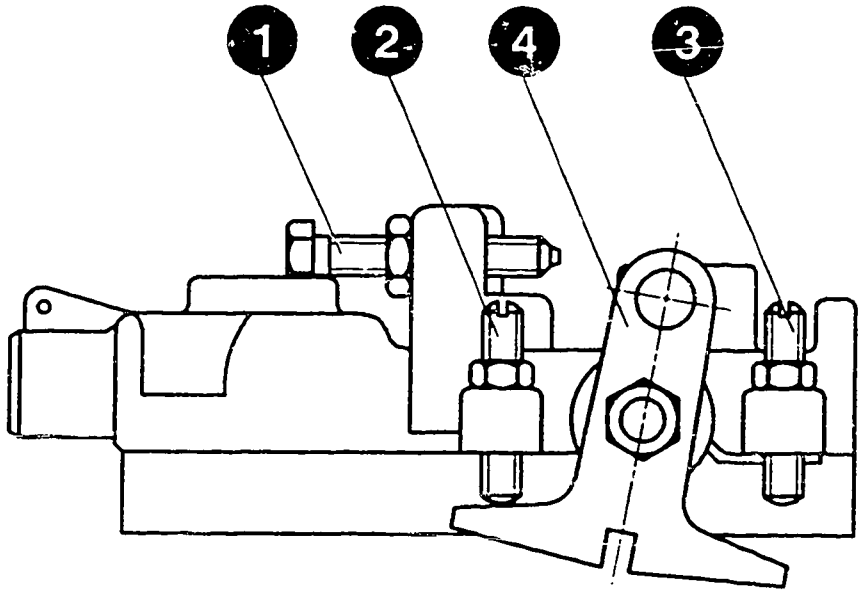
2 = Idle-quantity adjusting screw
4 = LFG stop lever

Adjusting idle quantity

Position LFG stop lever at
idle-quantity adjusting screw.

Set speed as per test-specification
sheet and measure delivery.
Set delivery in center of tolerance by
way of adjusting screw.

Continue: D05/1 Fig.: D04/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

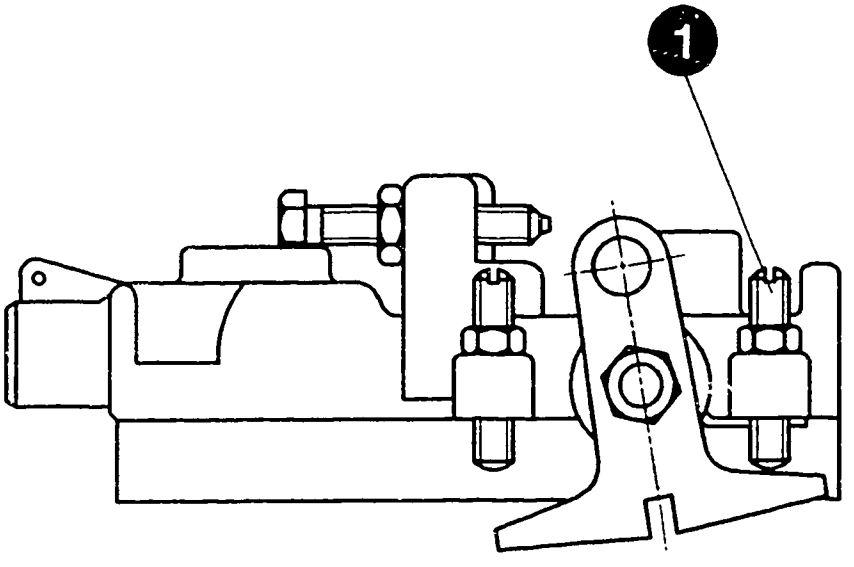
1 = Adjusting screw for high idle

Adjusting high idle quantity

Set speed.
Position LFG stop lever at adjusting screw for high idle.

Measure delivery.
Set delivery for high idle in center of tolerance.

Continue: D06/1 Fig.: D05/2



KMK02274

ADJUSTING LOAD-DEPENDENT START OF DELIVERY (LFB)
Select further adjustment as per test-specification sheet:

* Pump without LFB
  Static governor-shaft adjustment
  Coordinate D07/1

* Pump with LFB
  WITHOUT difference measurement
  Coordinate D08/1

* Pump with LFB
  WITH difference measurement
  Coordinate D10/1

Continue: D07/1

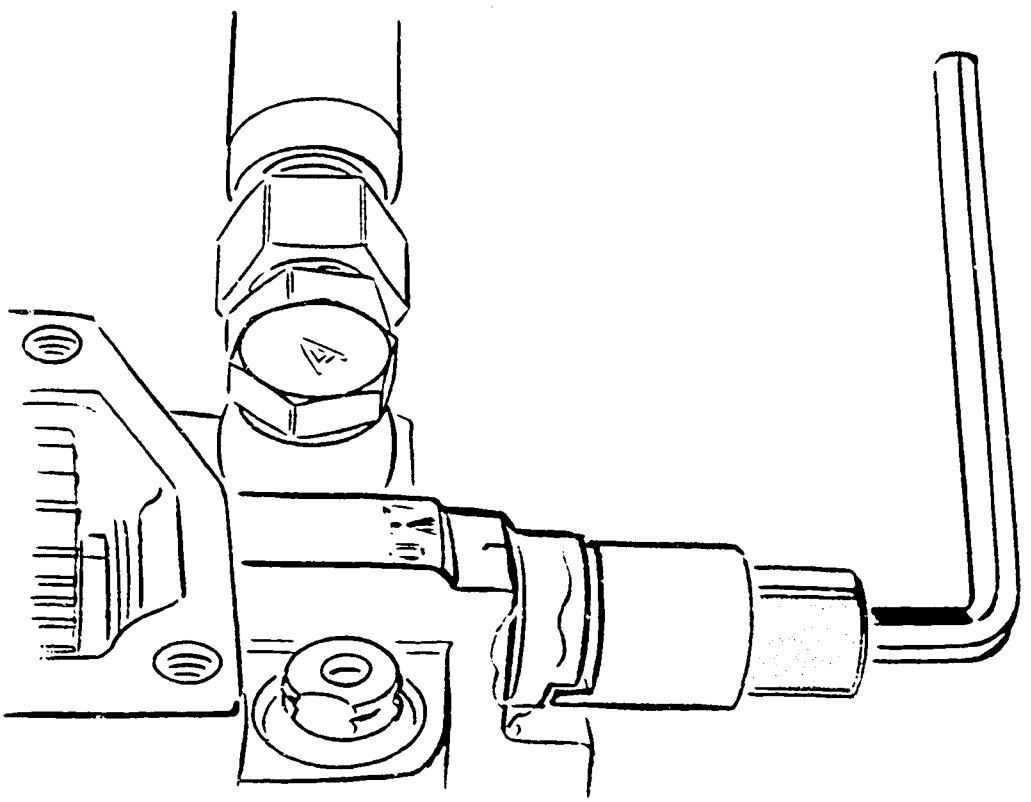
STATIC PRESETTING OF GOVERNOR SHAFT

* No speed indication in test-specification sheet
  Check presetting dimension approx. 1.5 mm of governor shaft

Correction:
Screw in governor shaft with adjusting tool KDEP 1082 for slotted nut or KDEP 1181 for hexagon nut until there is a distance of 1.5 mm between housing flange and end face of governor shaft.

Lock governor shaft.
Tightening torque 22...30.

Continue: D16/1 Fig.:



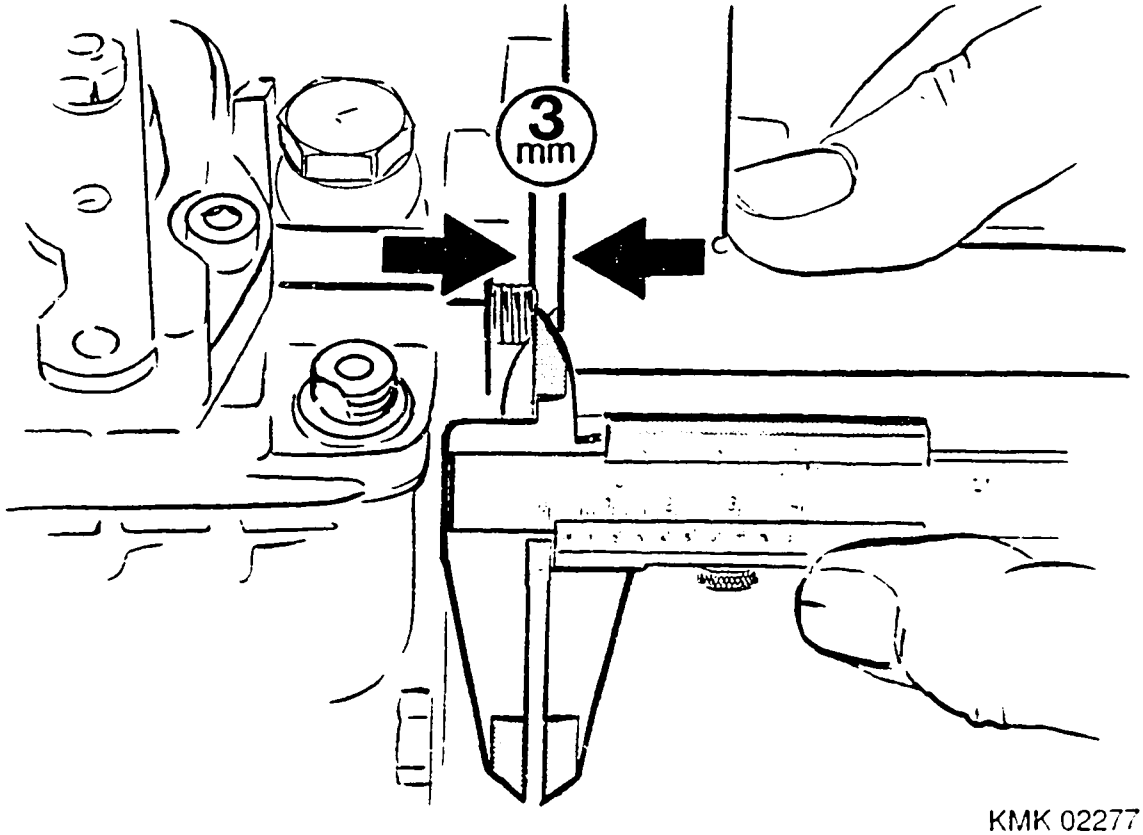
KMK 02278

ADJUSTING LOAD–DEPENDENT START OF DELIVERY

Speed indication in test–specification sheet WITHOUT difference measurement

Check governor shaft for spacing dimension approx. 3.0 mm.
Set speed indicated in test–specification sheet.
Screw out governor shaft with adjusting tool KDEP 1082 or KDEP 1181 until there is a reduction in the indicated supply pump pressure.
IMPORTANT: D A N G E R O F
A C C I D E N T
Wear goggles

Continue: D09/1 Fig.: D08/2



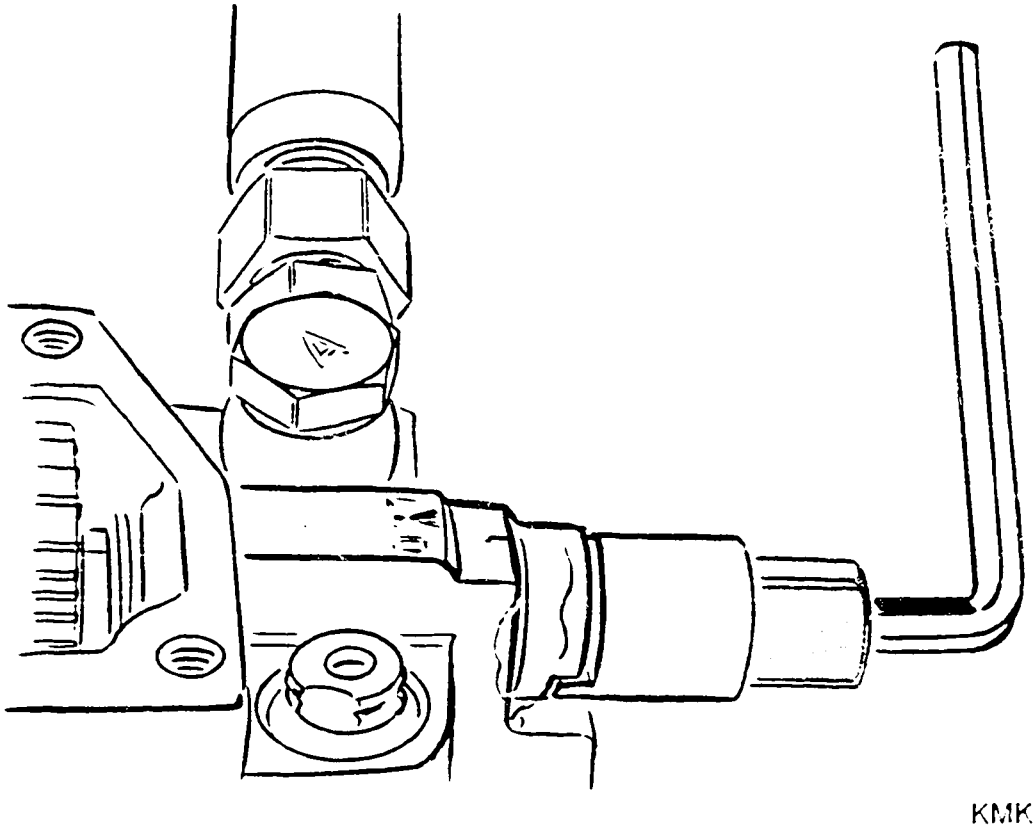
KMK 02277

ADJUSTING LOAD-DEPENDENT START OF DELIVERY

Speed indication in test-specification sheet WITHOUT difference measurement

IMPORTANT: D A N G E R O F
A C C I D E N T
Wear goggles
Then screw in governor shaft 1/8 of a turn.
Switch off injection-pump test bench.
Lock governor shaft with adjusting tool.
In doing so, counterhold with hexagon-socket-screw key.
Tightening torque 22...30 Nm.

Continue: D16/1 Fig.: D09/2



KMK 02278

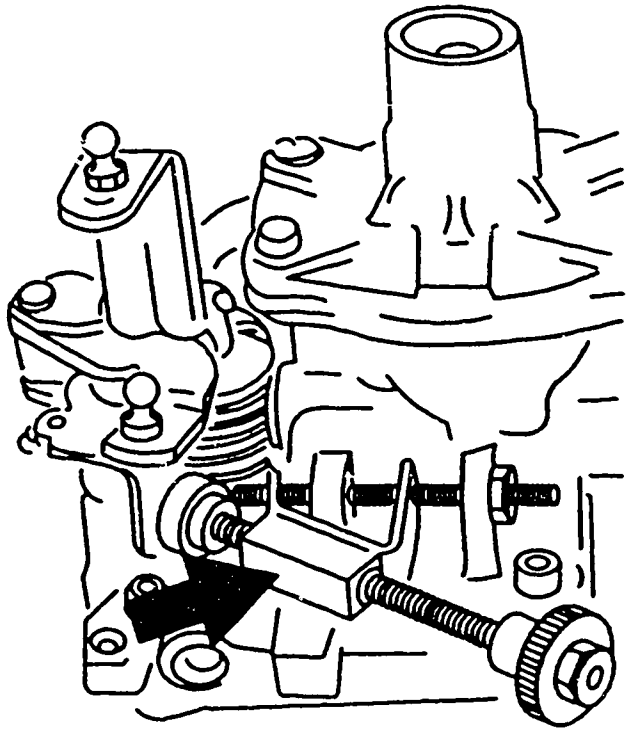
ADJUSTING LOAD-DEPENDENT START OF DELIVERY

* Speed indication in test-specification sheet WITH difference measurement

Arrow = Adjusting screw

Set stated speed.
Position control lever at rated-speed adjusting screw.
Measure and note down delivery, timing-device travel and supply pump pressure.
Move speed-control lever in direction of idle stop until there is a reduction in delivery as per test-specification sheet.
Hold lever if possible with adjusting screw KDEP 1177 or by way of idle adjusting screw.

Continue: D11/1 Fig.: D10/2



KMK02279

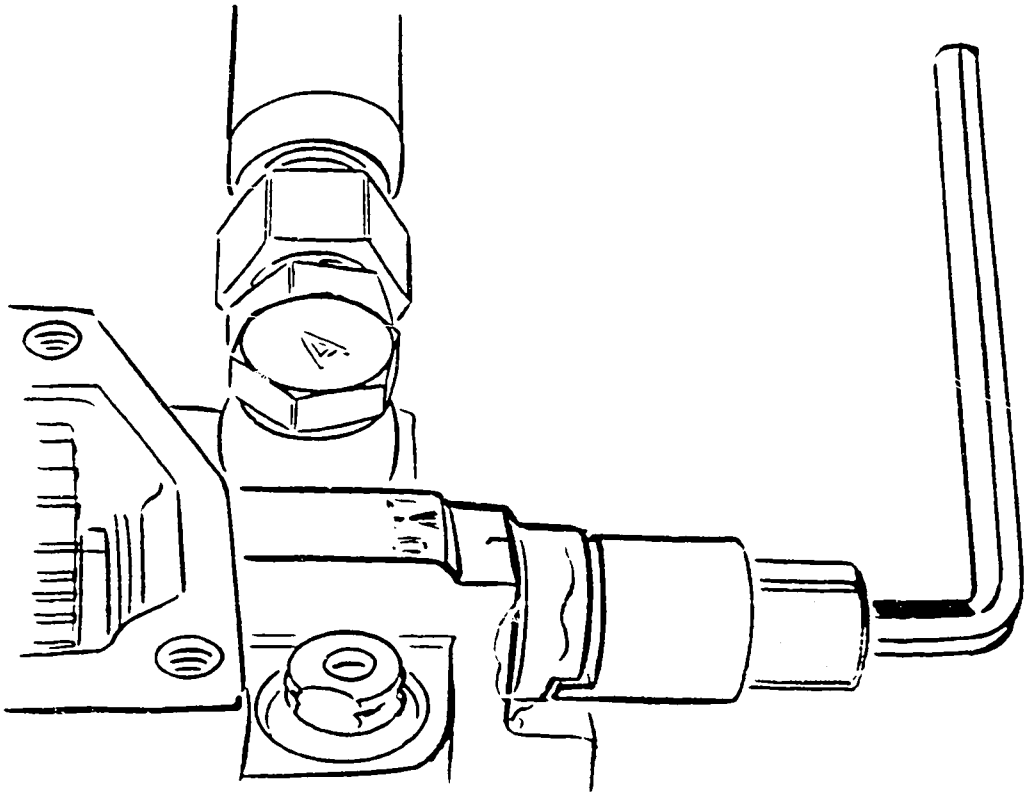
ADJUSTING LOAD-DEPENDENT START OF DELIVERY

Speed indication in test-specification sheet WITH difference measurement

IMPORTANT: D A N G E R O F
A C C I D E N T
Wear goggles

Turn governor shaft until timing-device travel and supply pump pressure as per test-specification sheet are attained. Lock governor shaft with adjusting tool KDEP 1082 (slotted nut) or KDEP 1181 (hexagon nut).
Counterhold governor shaft with hexagon-socket-screw key.
Tightening torque, lock nut 22..30 Nm
Check set timing-device travel.

Continue: D12/1 Fig.: D11/2



KMK 02278

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Note:
Non-EDP test-specification sheets do NOT indicate the idle quantity under low-idle speed regulation, but rather the residual quantity which must be set prior to idle adjustment.

Terms are marked with letters A - C.
A = Residual quantity adjustment
B = Idle quantity adjustment
C = High idle quantity

Continue: D12/2

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

N O T E :
LFB attachment, right (viewed towards drive)
Idle adjusting screw at LFG lever "left".

LFB attachment, left
Idle adjusting screw at LFG lever "right".

Continue: D13/1

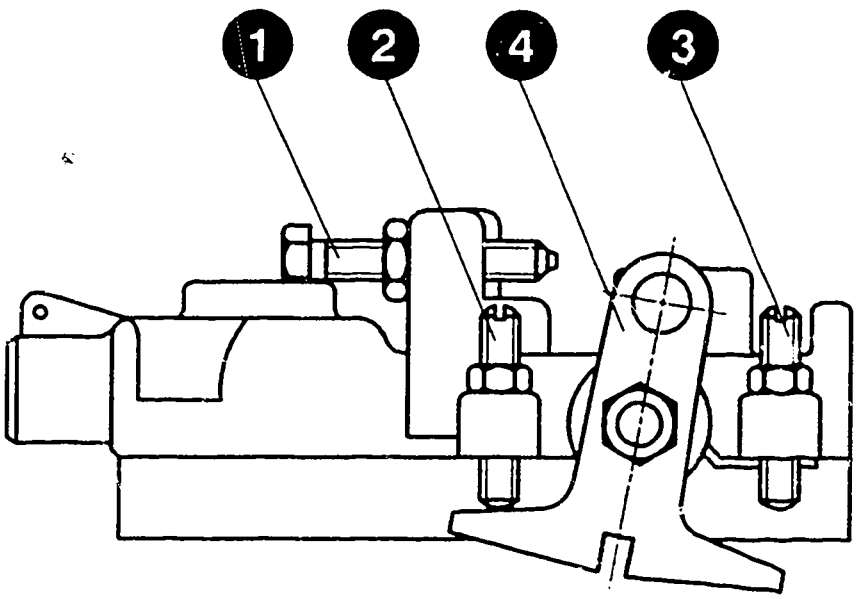
ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

Adjusting residual quantity

1 = Residual-quantity adjusting screw
2 = Adjusting screw, low idle
3 = Adjusting screw, high idle
4 = LFG stop lever

Screw out both idle adjusting screws.
Adjust speed as per test-specification sheet.
Measure delivery.
Adjust delivery to center of tolerance by way of residual-quantity adjusting screw.

Continue: D14/1 Fig.: D13/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

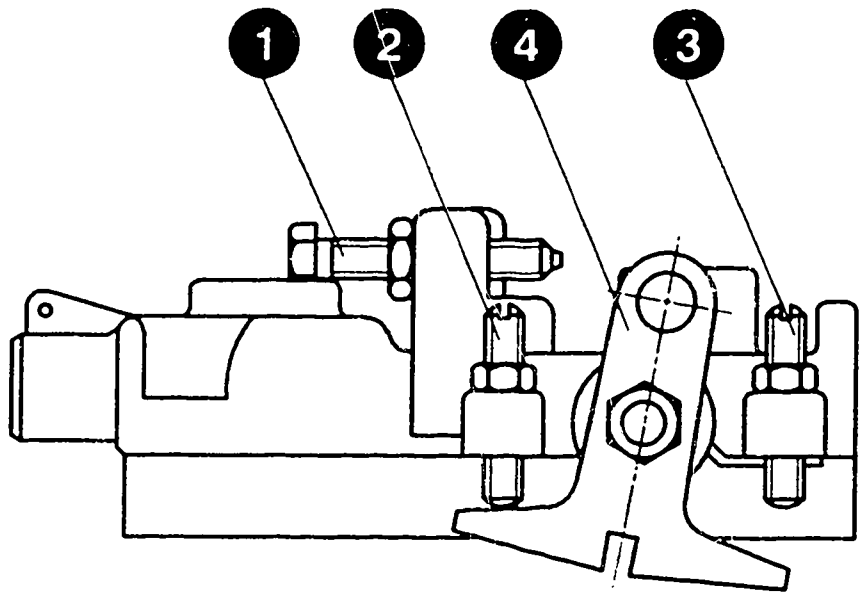
2 = Idle-quantity adjusting screw
4 = LFG stop lever

Adjusting idle quantity

Position LFG stop lever at
idle-quantity adjusting screw.

Set speed as per test-specification
sheet and measure delivery.
Set delivery in center of tolerance by
way of adjusting screw.

Continue: D15/1 Fig.: D14/2



KMK02273

ADJUSTING LOW-IDLE SPEED REGULATION
* Pump with LFG

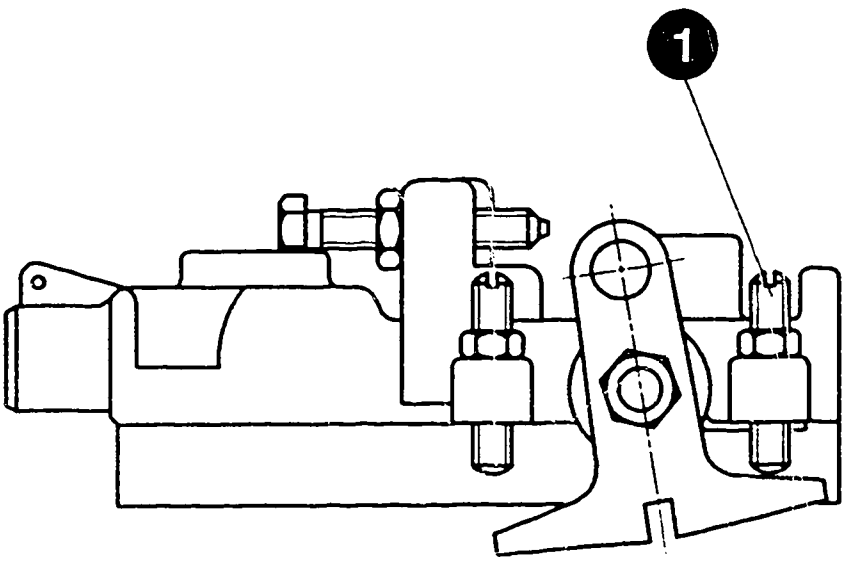
1 = Adjusting screw for high idle

Adjusting high idle quantity

Set speed.
Position LFG stop lever at adjusting screw for high idle.

Measure delivery.
Set delivery for high idle in center of tolerance.

Continue: D16/1 Fig.: D15/2



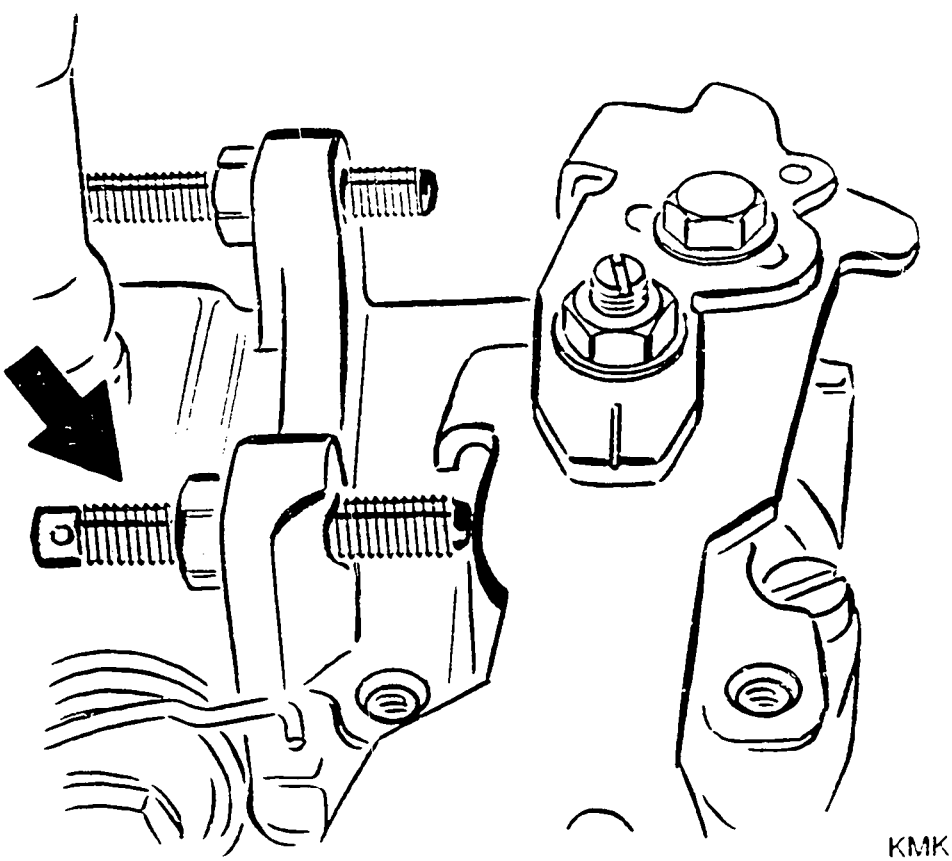
KMK02274

ADJUSTING FULL-LOAD SPEED REGULATION

Arrow = Rated-speed adjusting screw

Position control lever at rated-speed adjusting screw. Screw in adjusting screw until prescribed delivery is attained at stated speed.

Continue: D17/1 Fig.: D15/2



KMK 02275

MEASURING STARTING FUEL DELIVERY

Position control lever at rated-speed stop.
NOTE:
In the event of deviation e.g. positioning control lever at idle stop, indication is given under Remarks in test-specification sheet.
Measure starting fuel delivery.

Continue: D17/2

MEASURING STARTING FUEL DELIVERY

If starting fuel delivery is not attained, check sleeve-starting travel "MS dimension" in accordance with Section "Calibration work".
For calibration work refer to
Coordinate H21/1

If necessary, increase MS dimension (indication on test-specification sheet).
If starting fuel delivery is attained, check idle and full-load speed regulation.

Work through other causes as per repair instructions.

Continue: D18/1

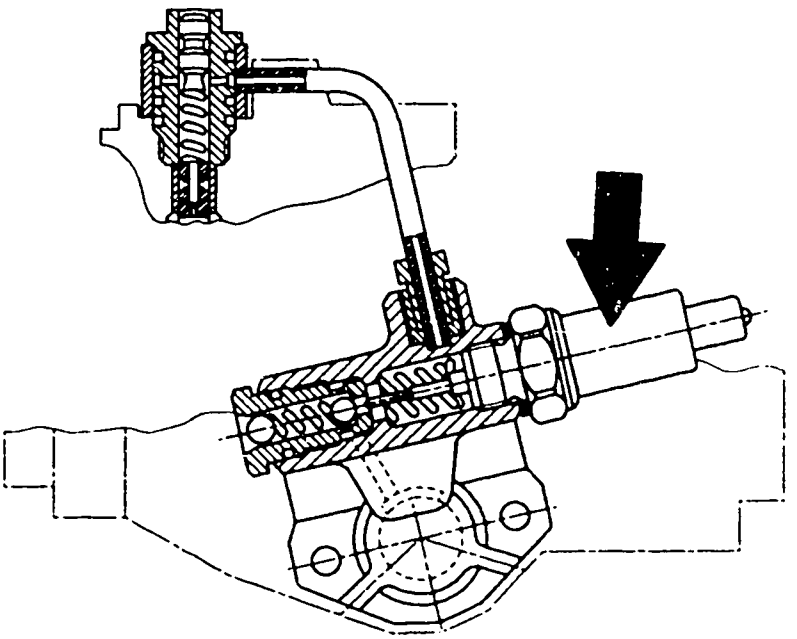
CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

* Checking supply pump pressure

Arrow = Expansion element

If a hydraulic KSB is attached, supply expansion element or pushing/pulling electromagnet with voltage as specified in test-specification sheet.

Continue: D19/1 Fig.: D18/2



KMK02263

CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

Position speed-control lever against rated-speed adjusting screw.
At the given speeds, the supply pump pressure profile and the timing-device profile must be attained within the adjustment tolerance (setting not in brackets).

Continue: D19/2

CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

Faults with the supply pump or pressure regulator affect the timing-device travel and supply pump pressure profile.

A fault in the timing device (incorrect spring) only affects the timing-device travel profile.

Continue: D20/1

CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

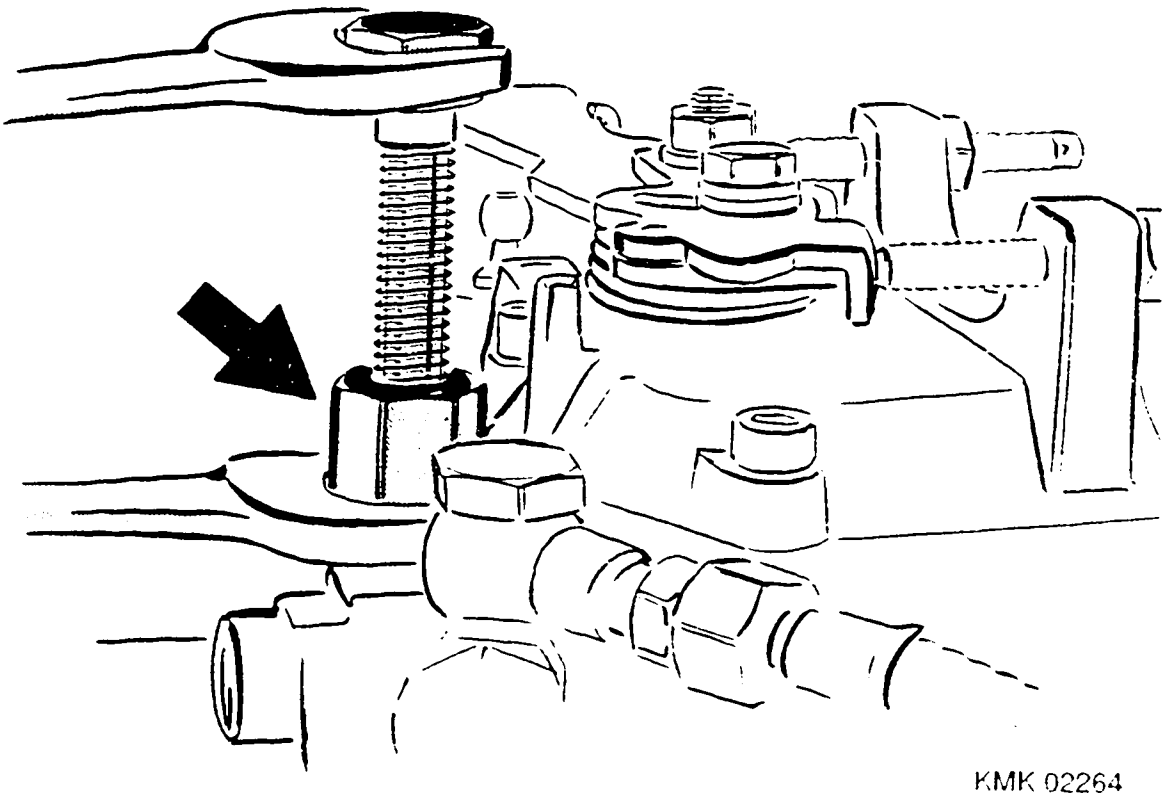
* Supply pump pressure too low:

Effect correction as follows.

Push pressing-in tool KDEP 1092 onto pressure regulator and turn through 90°. Counterhold with open-ended wrench (arrow).

Pressing in the plug with the pressing-in tool increases the supply pump pressure and thus advances the timing device (increased timing-device travel).

Continue: D21/1 Fig.: D20/2



KMK 02264

CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

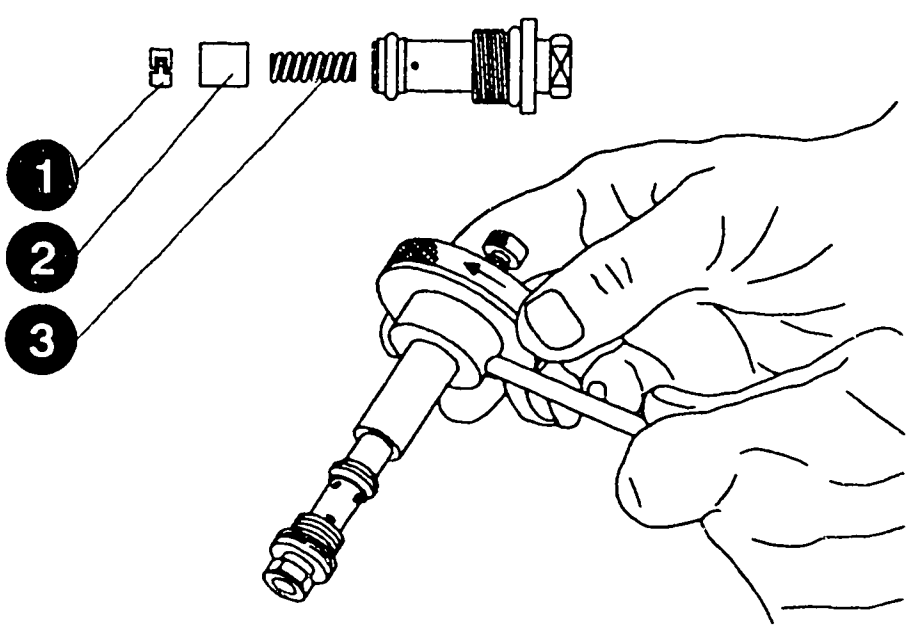
1 = Slotted spring pin
2 = Piston
3 = Pressure spring

* Supply pump pressure too high:

Correct as follows:

Remove pressure regulator with socket wrench KDEP 1086.
Remove slotted spring pin with puller KDEP 1027.
Remove piston and pressure spring.

Continue: D22/1 Fig.: D21/2



KMK02265

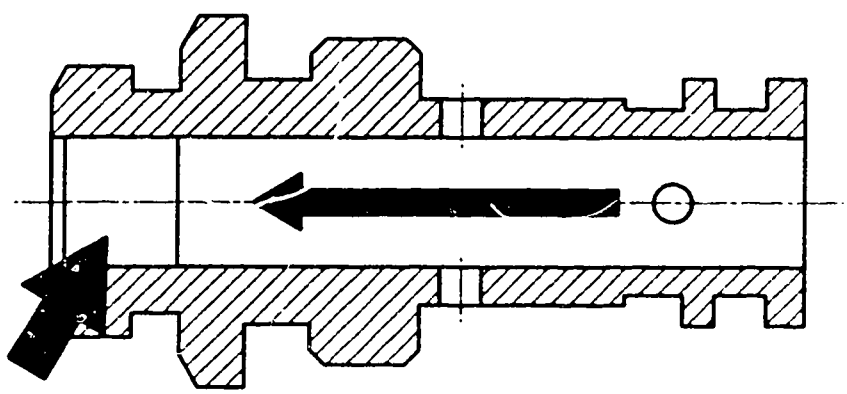
CHECKING AND ADJUSTING SUPPLY PUMP
PRESSURE PROFILE

Arrow = Plug

Press out plug.

Then re-install pressure spring and
piston in pressure regulator.

Continue: D23/1 Fig.: D22/2



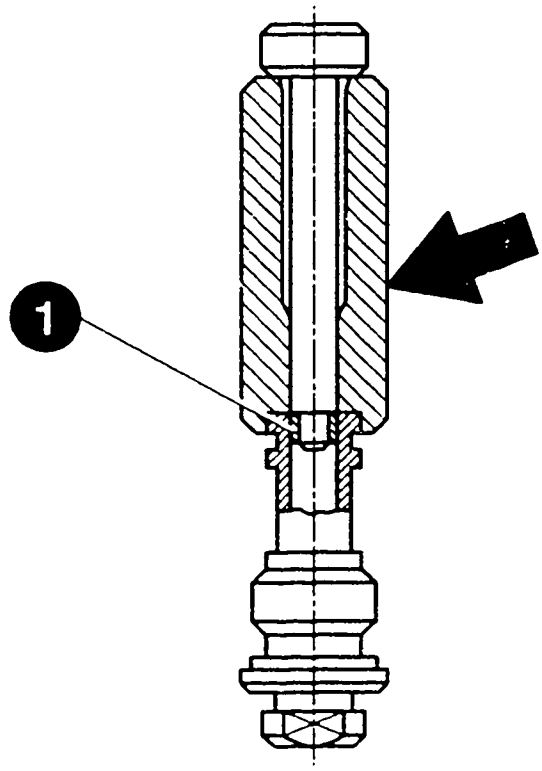
KMK02266

CHECKING AND ADJUSTING SUPPLY PUMP PRESSURE PROFILE

1 = Slotted spring pin

Press in new slotted spring pin with pressing-in tool KDEP 1093 (arrow) such that it is flat.
Install pressure regulator and tighten to tightening torque 7...10 Nm.
Repeat adjustment of supply pump pressure.
If supply pump pressure is not attained, eliminate cause in line with repair instructions.

Continue: D24/1 Fig.: D23/2



KMK02267

CHECKING AND ADJUSTING HYDRAULIC COLD-START ACCELERATION DEVICE (KSB)

Select adjustment in accordance with following add-on modules:

- Checking VE pump with no hydraulic cold-start acceleration device (KSB)
  Coordinate E04/1

- Checking VE pump with hydraulic cold-start acceleration device
  Coordinate D25/1

Continue: D25/1

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

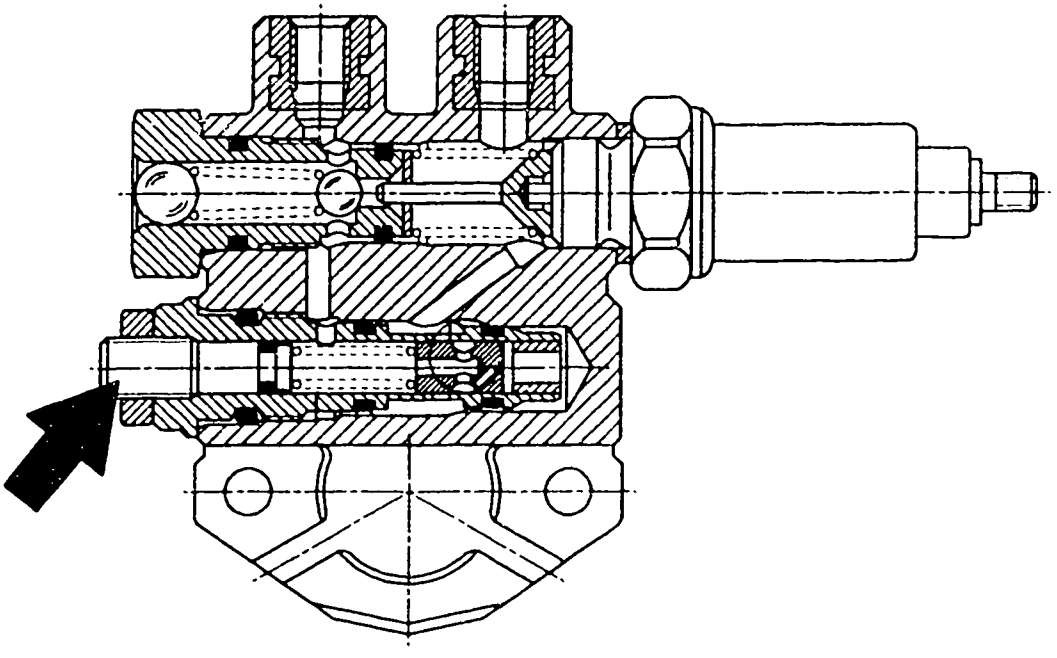
1 = Adjusting screw

Select adjustment in line with following add-on modules:

KSB profile not externally adjustable
No adjusting screw
Coordinate D26/1

KSB profile adjustable by way of adjusting screw
Coordinate D28/1

Continue: D26/1 Fig.: D25/2



KMK02280

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

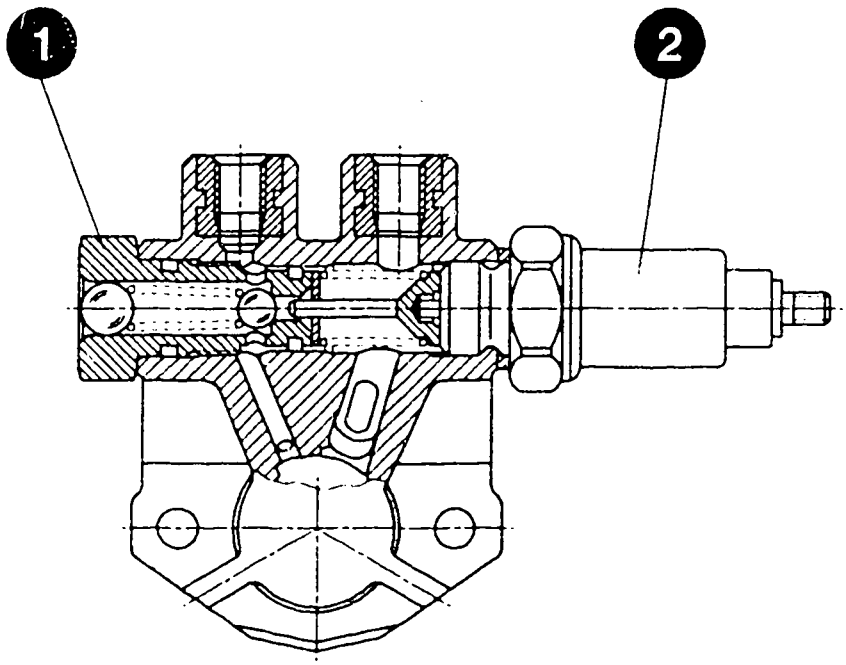
* Version not adjustable by way of adjusting screw

1 = KSB ball valve
2 = Expansion element

* Checking KSB profile "engine cold"
  Remove voltage supply at expansion element or solenoid valve.

Allow KSB to cool down.
Screw out ball valve approx. 2 mm.
Set speed for KSB adjustment point and measure timing-device travel.
Adjust KSB cut-in point if timing-device travel is not obtained.

Continue: D27/1 Fig.: D26/2



KMK02281

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

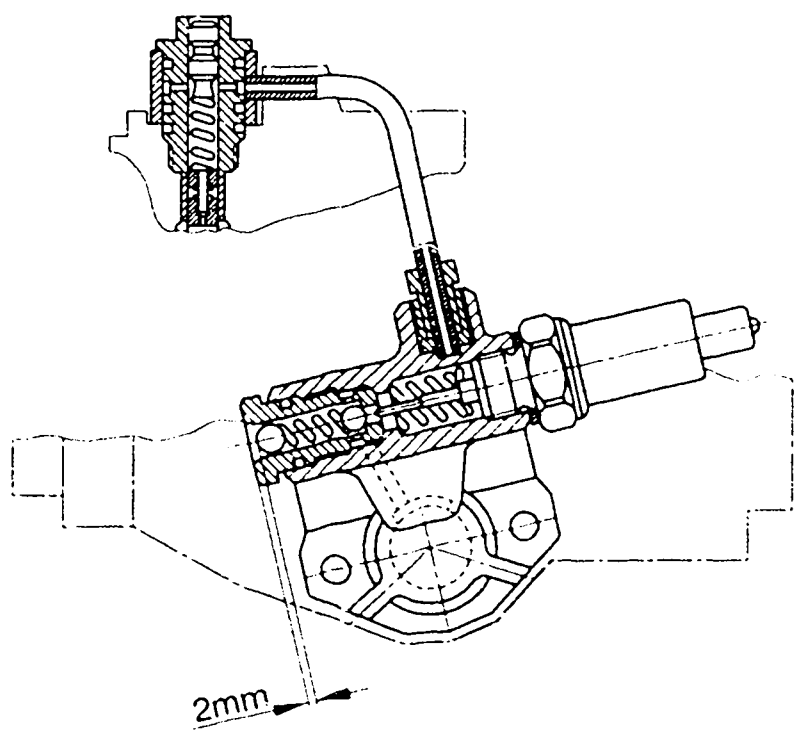
Arrow = KSB ball valve

* Adjusting KSB cut-in point
  - KSB travel inadequate

At stated speed, carefully knocking ball valve until timing-device travel is obtained.
Replace ball valve if timing-device travel cannot be set.

Perm. knock-in depth for ball 2 mm.

Continue: E04/1 Fig.: D27/2



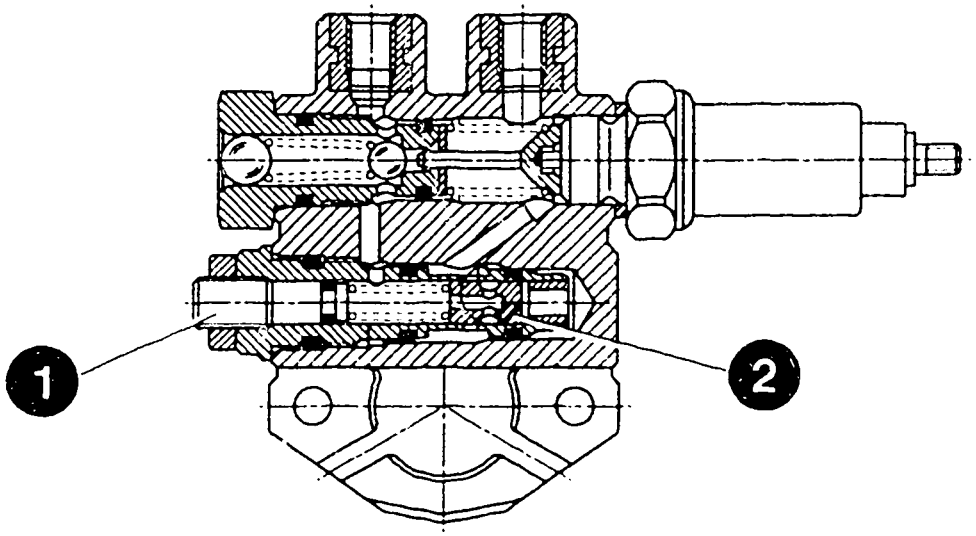
KMK02282

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

1 = Adjusting screw
2 = Safety cutout

The following text refers to externally adjustable KSB version. In the case of this version with safety cutout in the adjusting screw (separate from pressure regulator), the KSB profile is set by way of the adjusting screw.

Continue: E01/1 Fig.: D28/2



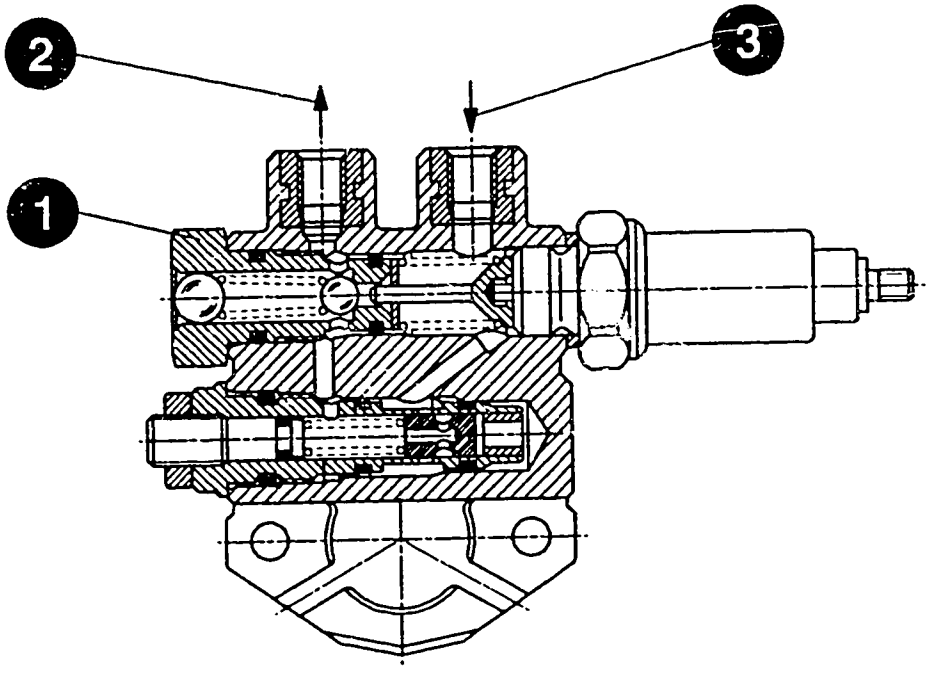
KMK02283

CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

* Connection diagram

1 = Ball valve
2 = To inlet side
3 = From pressure regulator

Continue: E02/1 Fig.: E01/2



KMK02284

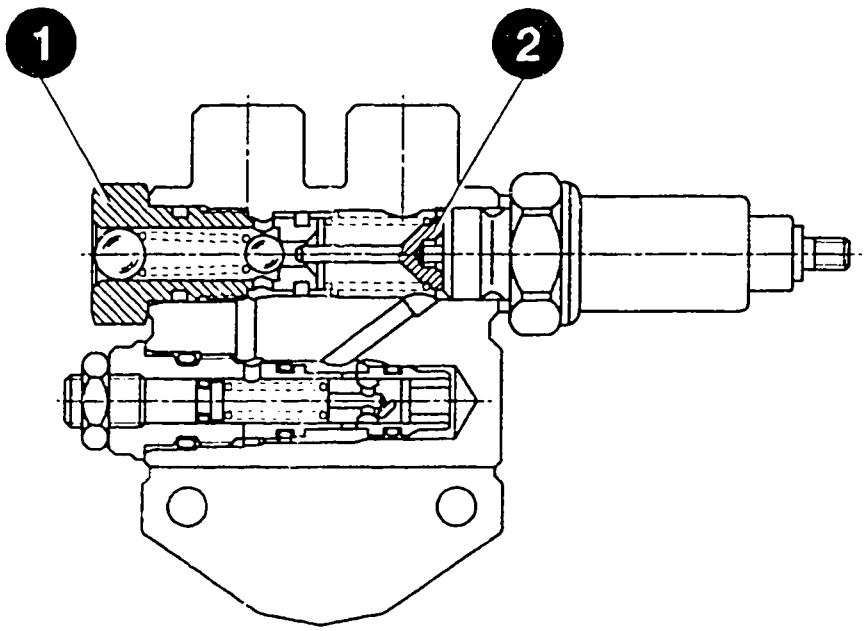
CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

1 = Ball valve
2 = Thrust piece

* Checking KSB profile "engine cold"

Remove voltage supply at expansion element.
Remove expansion element or solenoid valve and take out thrust piece.
Fit expansion element or solenoid valve.

Continue: E03/1 Fig.: E02/2



KMK02285

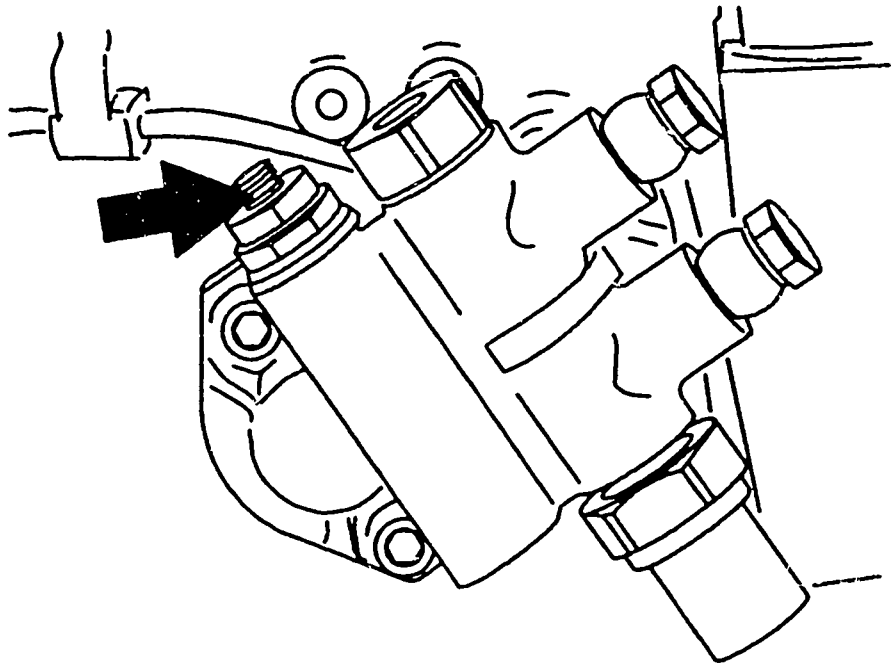
CHECKING AND ADJUSTING COLD-START ACCELERATION DEVICE (KSB)

Arrow = Adjusting screw

* Checking KSB profile "engine cold".

Set adjustment speed "A" as per test-specification sheet and adjust timing-device travel if necessary by way of adjusting screw.
Set speed "B" and check KSB profile.
Install thrust piece.
Apply voltage supply to expansion element and check timing-device profile.

Continue: E04/1 Fig.: E03/2



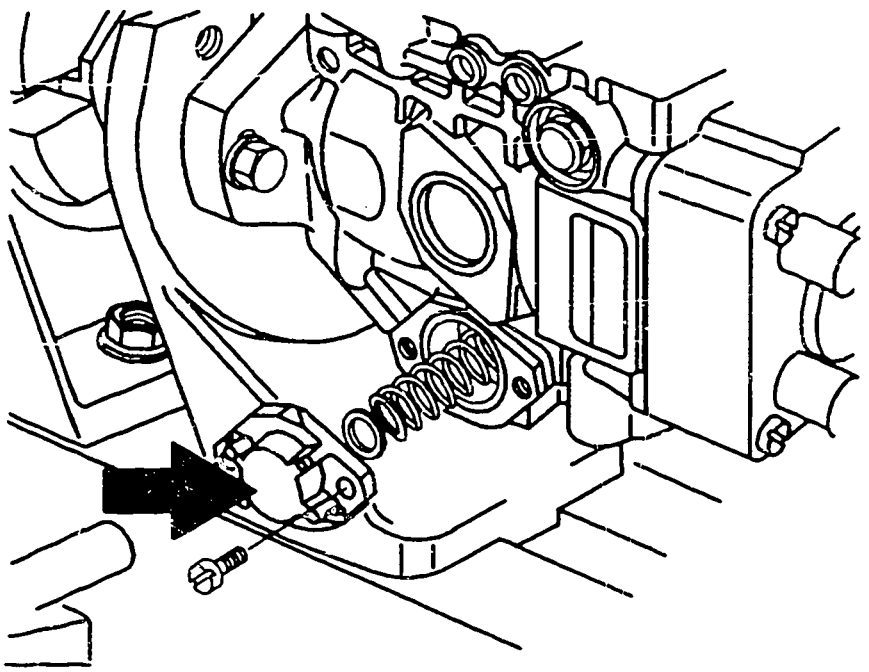
KMK02286

CHECKING AND ADJUSTING TIMING-DEVICE PROFILE

Arrow = Timing-device cover

Position speed-control lever against rated-speed adjusting screw.
At the stated speeds, the timing-device profile must be within the adjustment tolerance. If the prescribed timing-device travel is not attained on utilizing the tolerance for the supply pump pressure, check timing-device shims.
Remove timing-device cover (spring end).

Continue: E05/1 Fig.: E04/2



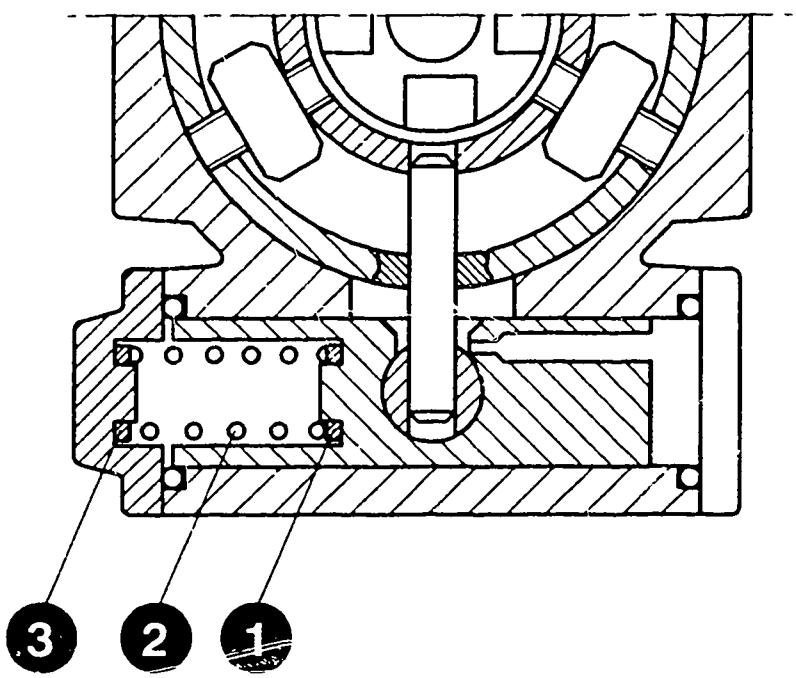
KMK02268

CHECKING AND ADJUSTING TIMING-DEVICE PROFILE

1 = Shim
2 = Pressure spring
3 = Timing-device shims

Measure thickness of shims comprising:
 * Items 1 and 3
(Allow for shim 1) and compare to dimension "SVS" as per test-specification sheet.
Insert approx. 0.6 mm thick shim in timing-device piston.
Insert pressure spring.

Continue: E06/1 Fig.: E05/2



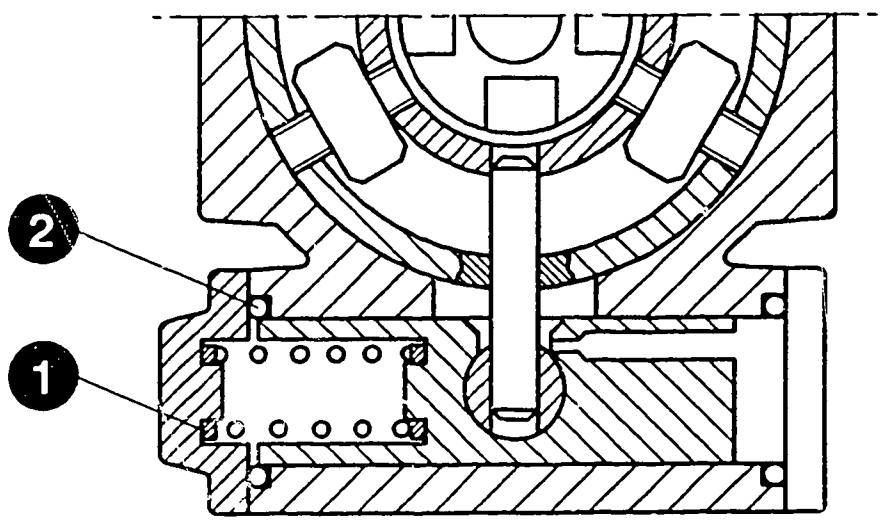
KMK02269

CHECKING AND ADJUSTING TIMING-DEVICE PROFILE

1 = Timing-device shims
2 = Sealing ring

Insert sealing ring and install cover with remaining shims (which produce dimension "SVS").
Note:
There must be at least 1 shim on either side of pressure spring.

Continue: E07/1 Fig.: E06/2



KMK02358

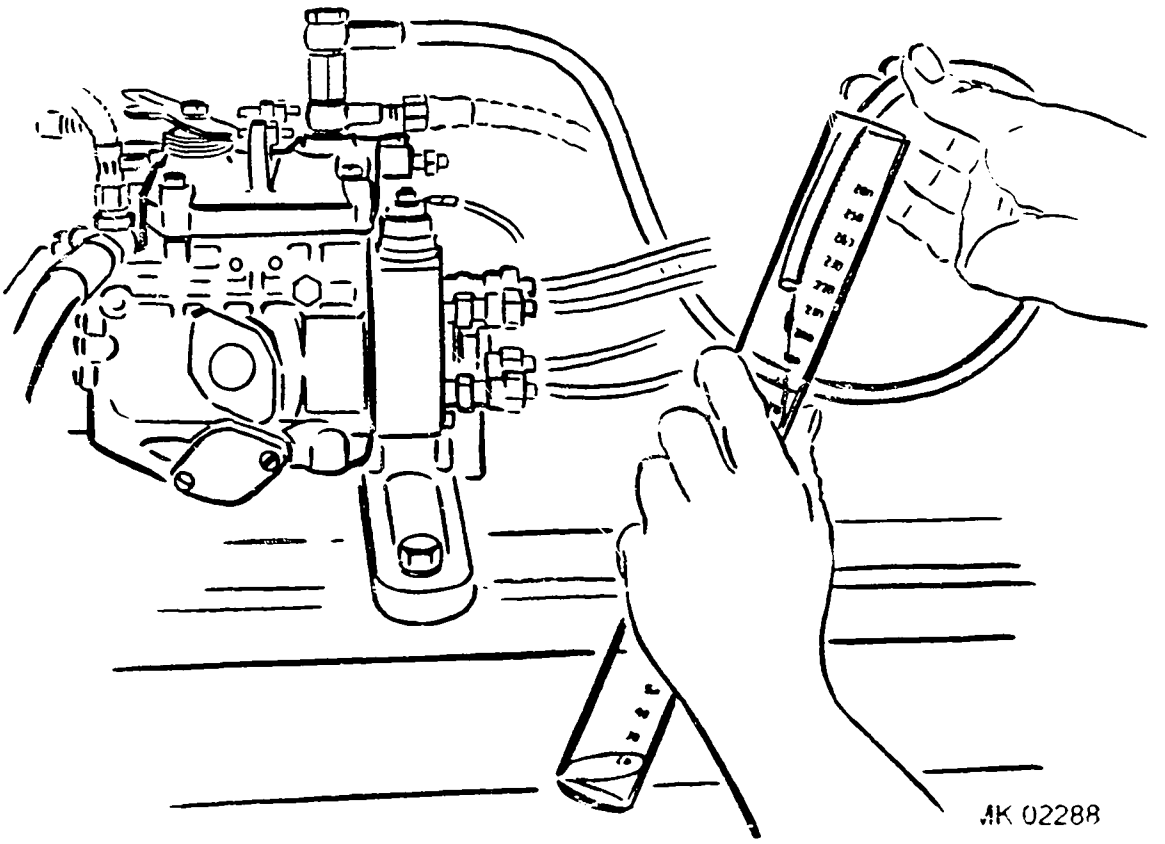
MEASURING OVERFLOW

Position control lever at rated-speed adjusting screw.

Measure overflow at return with appropriate graduate at specified pump speed.

If the overflow is not within the tolerance, check overflow restriction as specified in test-specification sheet or service-parts list/replace if necessary.

Continue: E08/1 Fig.: E07/2



CHECKING DELIVERIES AND BREAKAWAY CHARACTERISTIC

Position control lever against rated-speed adjusting screw.

Measure deliveries at stated speeds. If deliveries are not attained, eliminate cause with repair instructions.

Continue: E09/1

CHECKING ZERO DELIVERY (STOP)

Select adjustment in accordance with following additional functions:

Electr. shut-off device
Coordinate E09/2

Mechanical shut-off device
Coordinate E10/1

Continue: E09/2

CHECKING ZERO DELIVERY (STOP)

Electr. shut-off device:

Position control lever at idle stop screw.
Set pump speed.
Apply prescribed voltage to shutoff solenoid.
Zero delivery must be attained.
Renew shutoff solenoid if zero delivery is not attained.

Continue: E10/1

CHECKING ZERO DELIVERY (STOP)

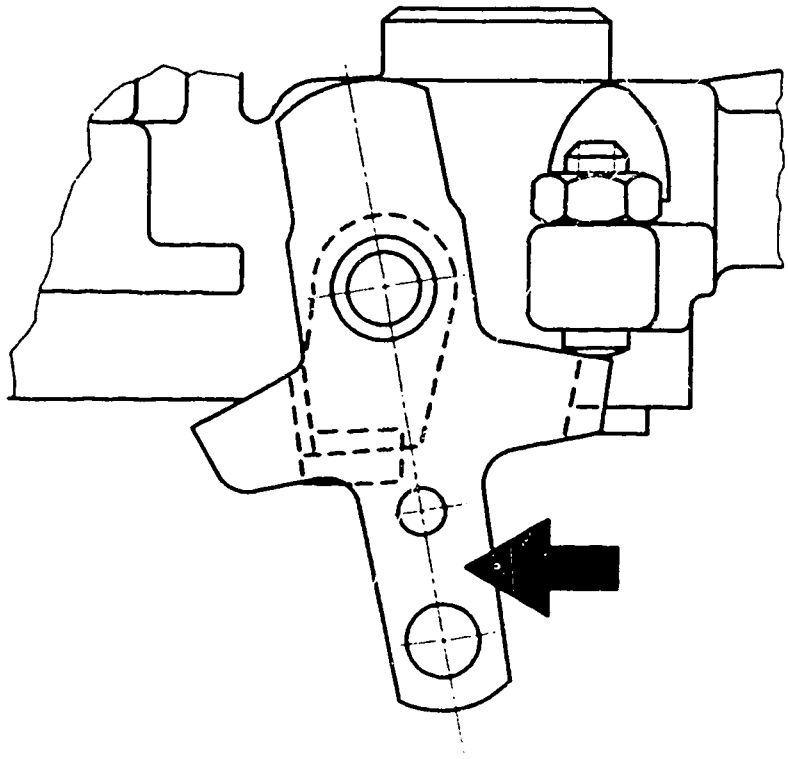
Arrow = Stop lever

Mechanical shut-off device:

Set pump speed.
Press stop lever; zero delivery must be attained.

Check stop lever and regulating lever installation positions if zero delivery is not attained.

Continue: E11/1 Fig.: E10/2



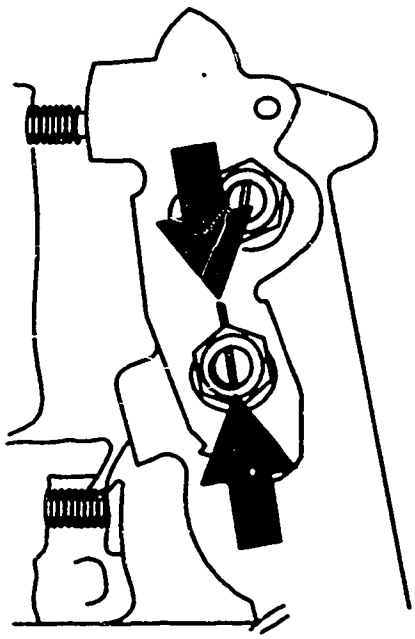
KMK02355

ADJUSTING STOP/REGULATING LEVER

Mark control lever and shaft with respect to one another (arrows).
Remove fastening screws for distributor-pump cover.
Raise cover and press shaft inwards.

Adjustment of the various shut-off devices is governed by the shape of the stop/regulating lever.
Refer to next Coordinate for distinguishing feature.

Continue: E12/1 Fig.: E11/2



KMK02289

ADJUSTING STOP/REGULATING LEVER

The distinguishing feature of the various shut-off devices is the shape of the stop/regulating lever.

Select stop-lever variants as illustrated:

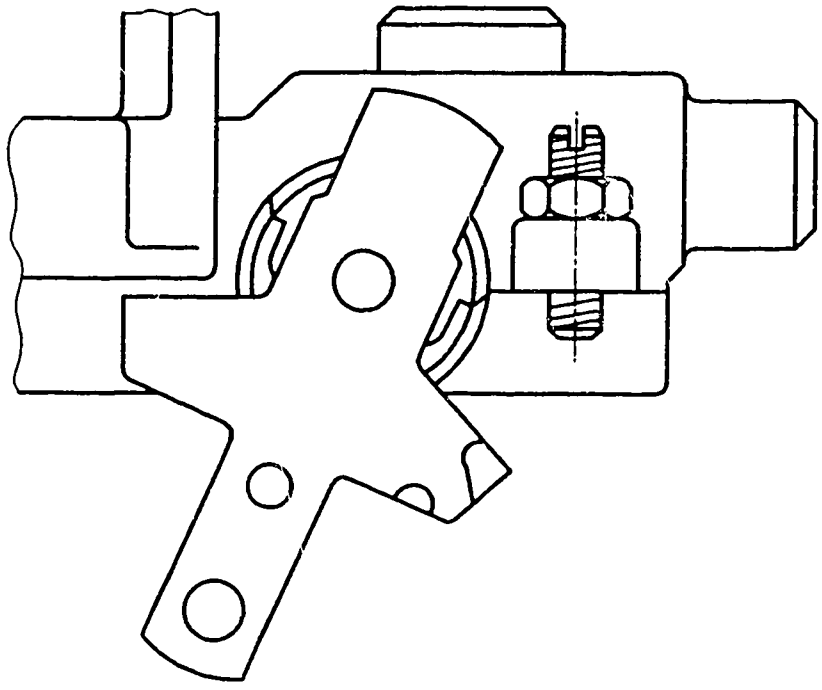
	Coordinate
* Standard version Stop-lever stop, left	E13/1
* Standard version Stop-lever stop, right	E14/1
* Special version A	E15/1
* Special version B	E16/1
* Negative torque control	E17/1

Continue: E13/1

ADJUSTING STOP/REGULATING LEVER

Stop lever, left
Standard version

Continue: E18/1 Fig.: E13/2

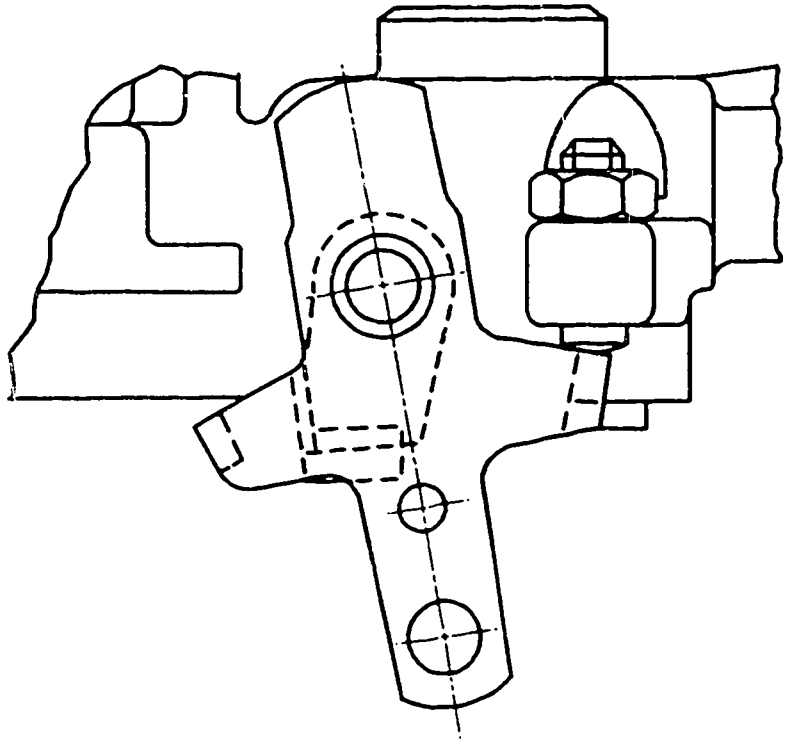


KMK02360

ADJUSTING STOP/REGULATING LEVER

Stop lever, right
Standard version

Continue: E20/1 Fig.: E14/2

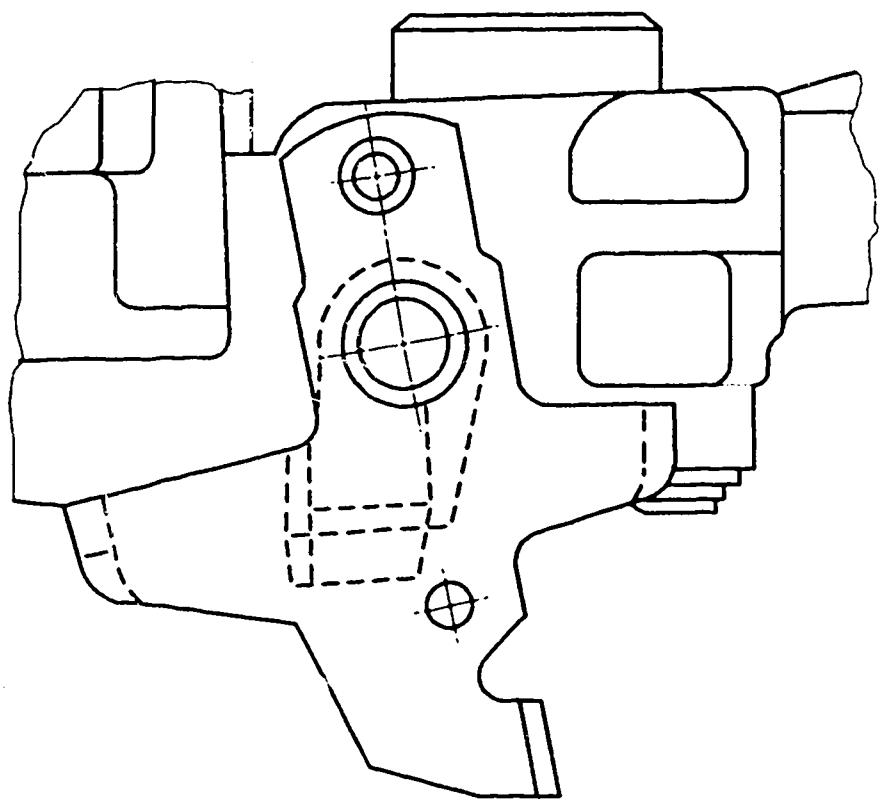


KMK02291

ADJUSTING STOP/REGULATING LEVER

Stop lever –
Special version A:

Continue: E24/1 Fig.: E15/2

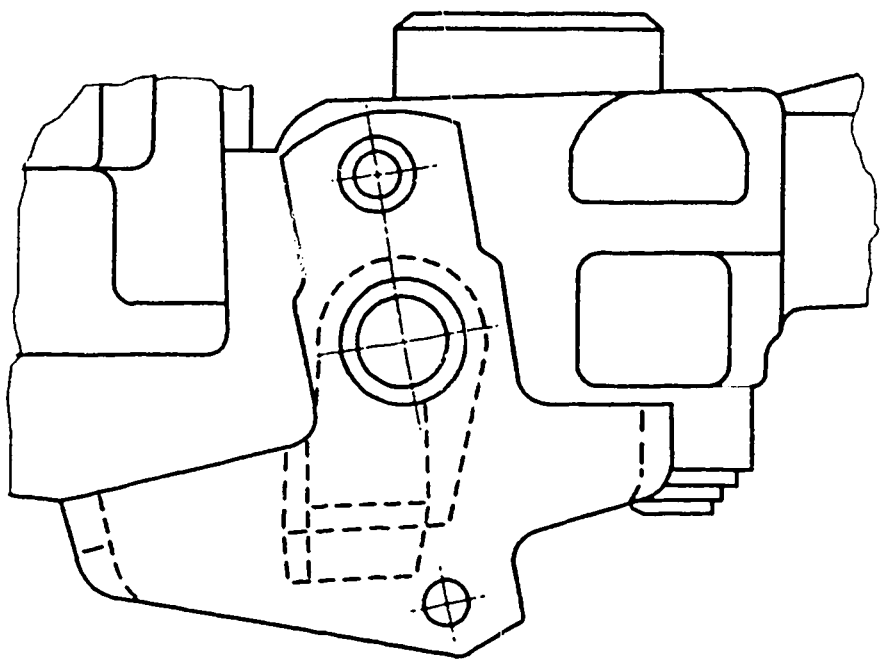


KMK02292

ADJUSTING STOP/REGULATING LEVER

Stop lever –
Special version B

Continue: E27/1 Fig.: E16/2

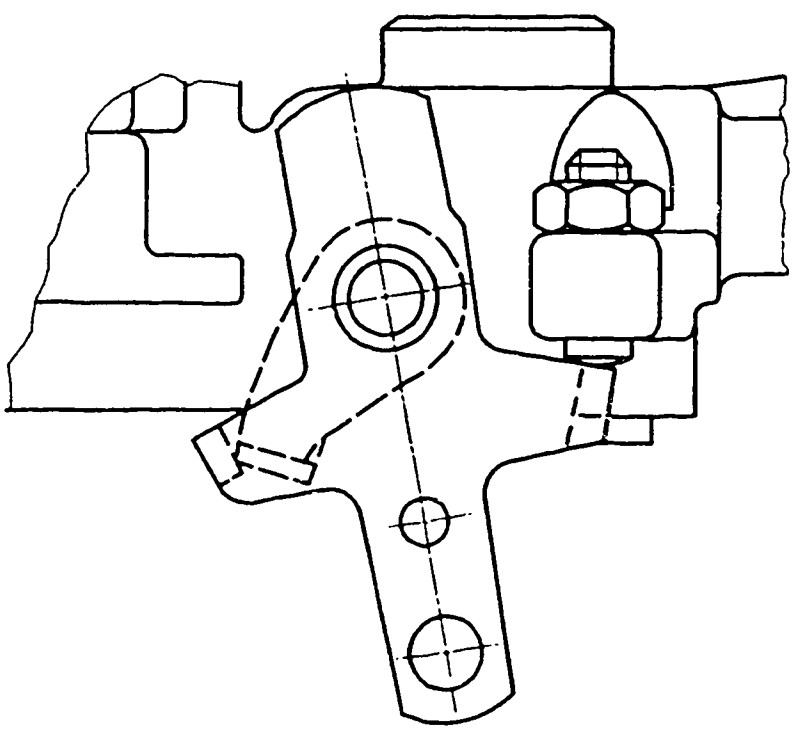


KMK02293

ADJUSTING STOP/REGULATING LEVER

Stop lever –
Negative torque control

Continue: F02/1 Fig.: E17/2



KMK02294

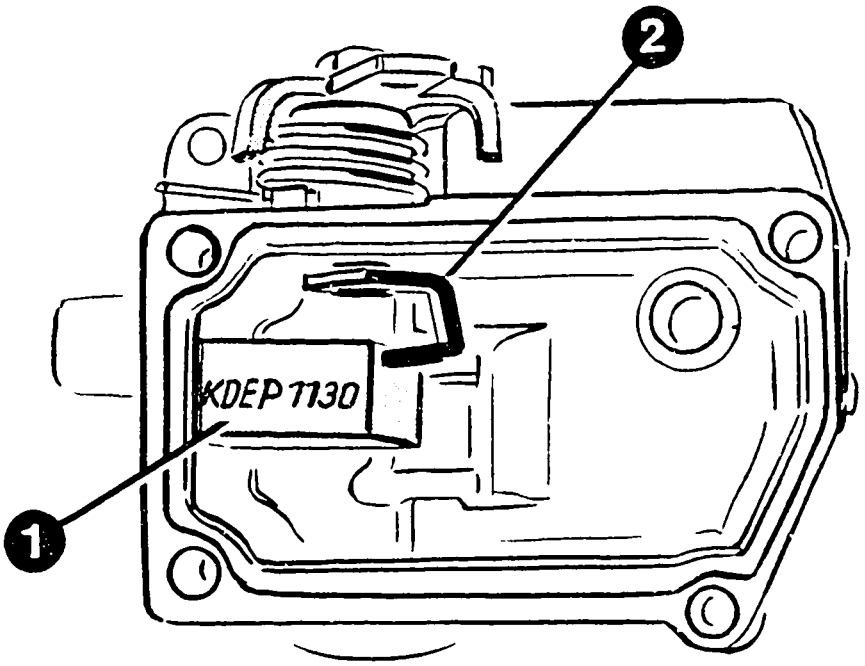
ADJUSTING STOP/REGULATING LEVER

* Stop lever, left, standard version

1 = Spacer KDEP 1130
2 = Regulating lever

Position spacer KDEP 1130 between inside edge of housing cover and regulating lever.

Continue: E19/1 Fig.: E18/2



KMK 02295

ADJUSTING STOP/REGULATING LEVER

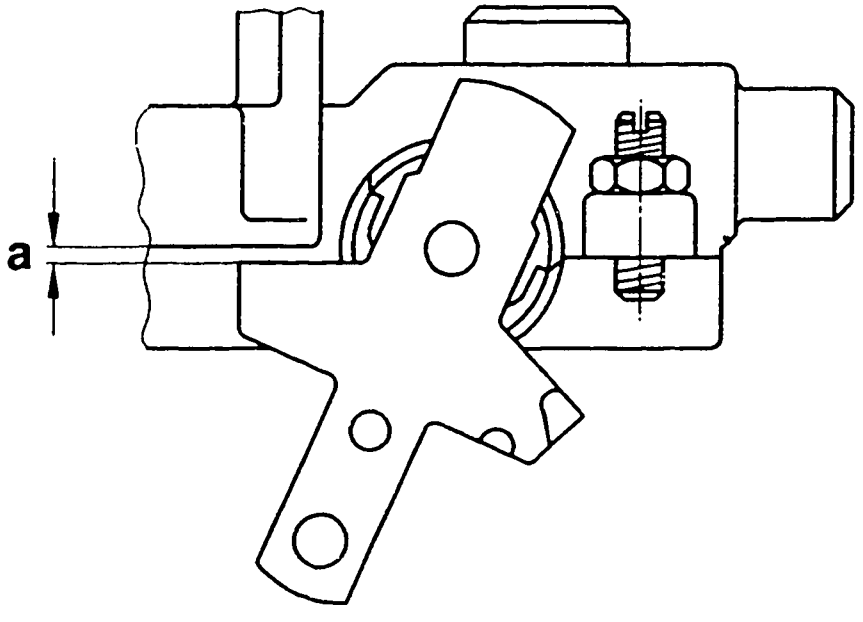
* Stop lever, left, standard version

Position stop lever on setting shaft.

There must be a gap "a" = 2...5 mm between stop lever and housing in this position.

If not, alter stop lever.

Continue: F06/1 Fig.: E19/2



KMK02290

ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

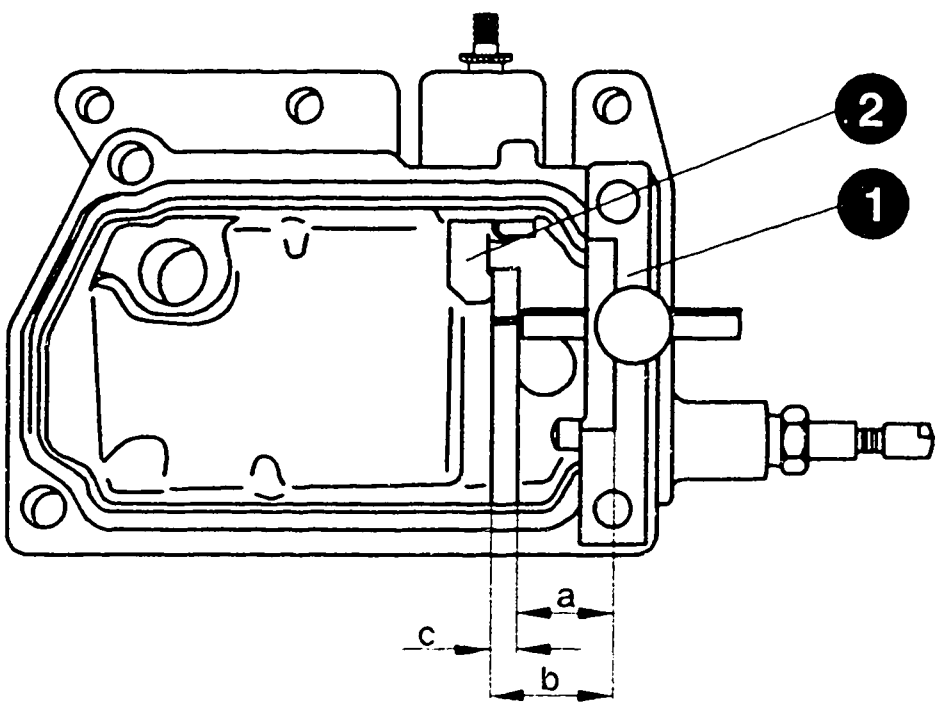
1 = Measurement tool
2 = Regulating lever

Attach KDEP 1152/3 to housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a=b-c) and adjust measurement arm to this dimension.

Dimension "b"= 19.3 mm

Continue: E21/1 Fig.: E20/2



KMK02296

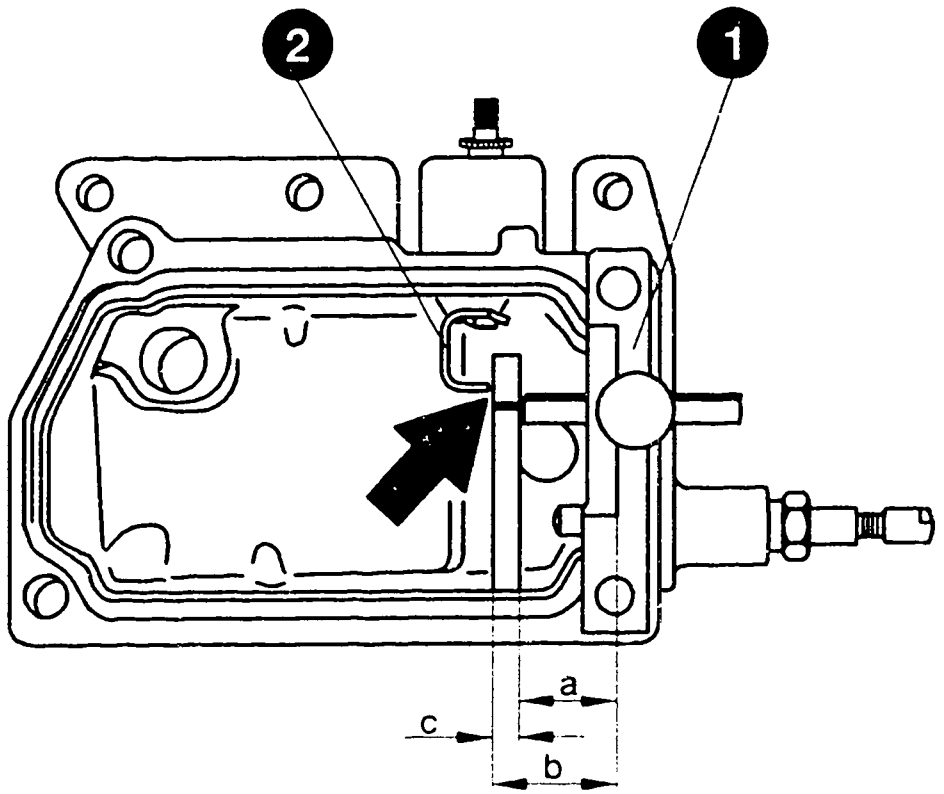
ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow). Regulating lever must be in contact with measurement arm KDEP 1152/3 for subsequent operations.

Continue: E22/1 Fig.: E21/2



KMK02297

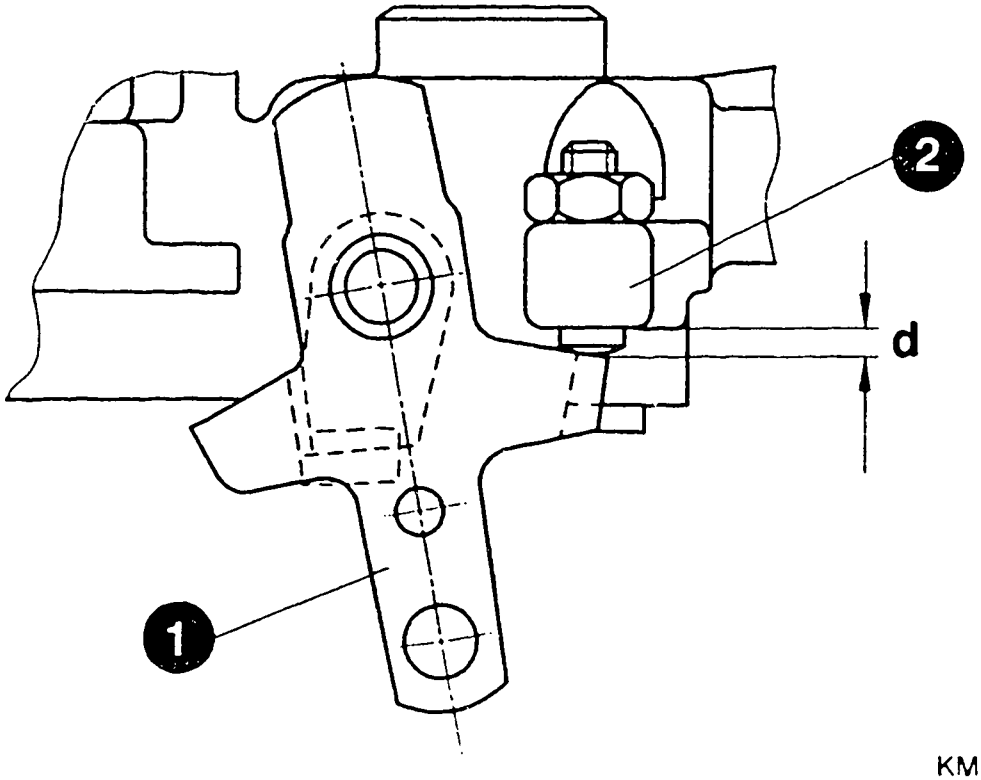
ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

1 = Stop lever
2 = Housing stop

Position stop lever on setting-shaft toothing such that dimension "d" between lever and housing stop is as small as possible.
Engage spring.
Press stop lever in direction of housing stop and, at the same time, tighten hexagon nut on setting shaft.
Tightening torque 5...10 Nm.

Continue: E23/1 Fig.: E22/2



KMK02298

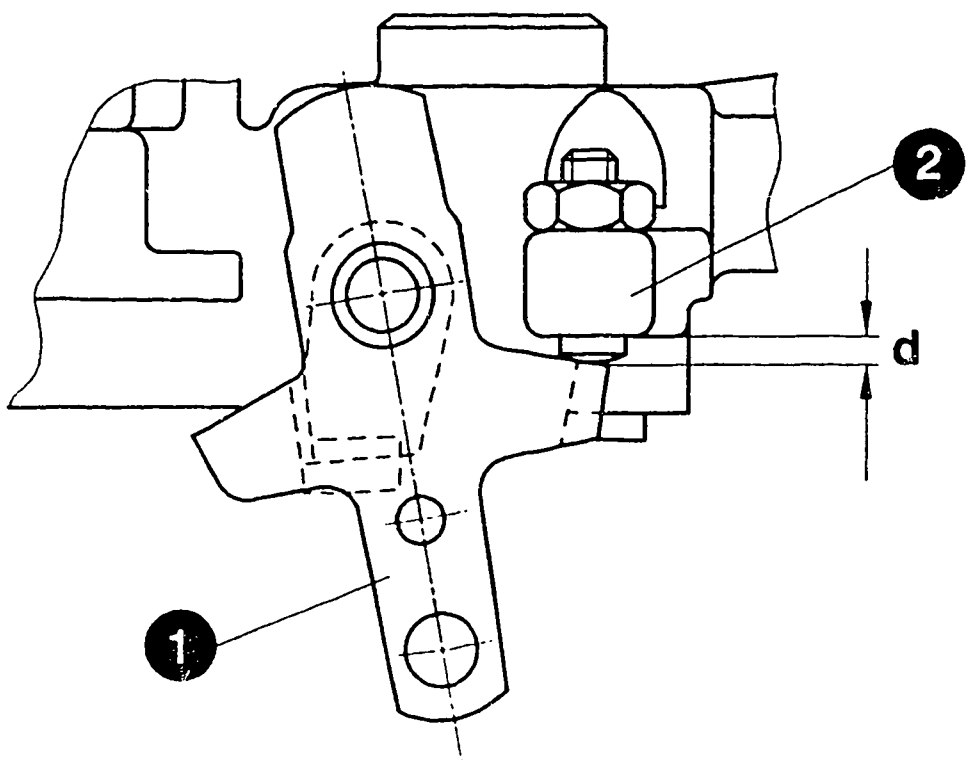
ADJUSTING STOP/REGULATING LEVER

* Stop lever, right, standard version

1 = Stop lever
2 = Stop screw

Close stop screw on stop lever (dimension "d") and tighten lock nut to tightening torque of 6...9 Nm.

Continue: F06/1 Fig.: E23/2



KMK02298

ADJUSTING STOP/REGULATING LEVER

* Special version A

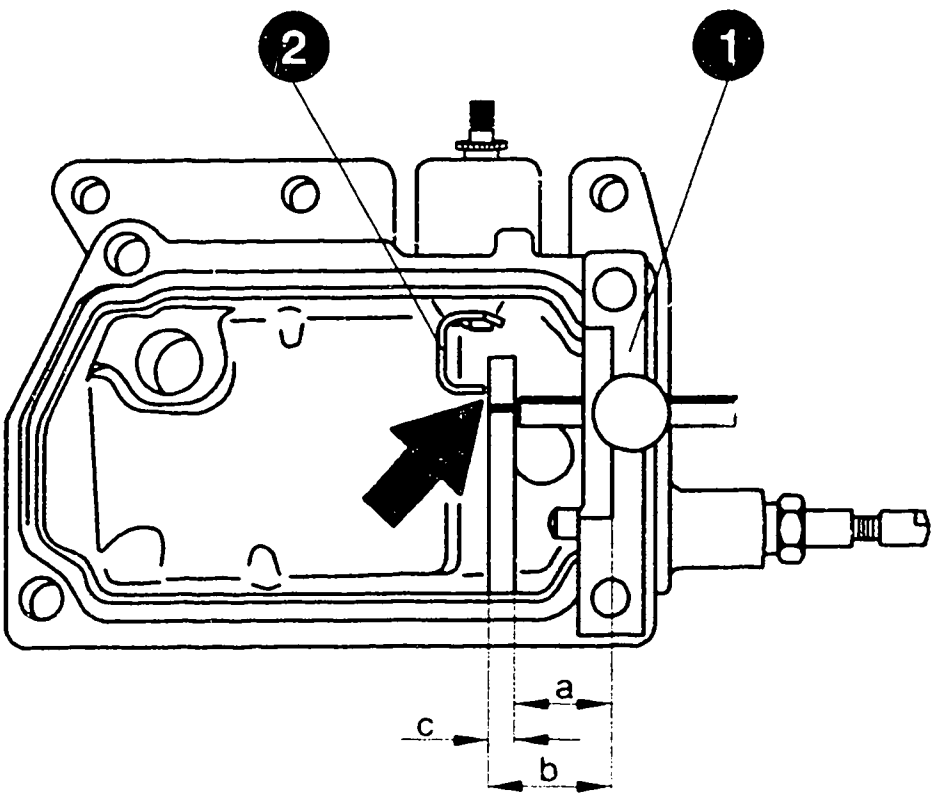
1 = Measurement tool
2 = Regulating lever

Position KDEP 1152/3 on housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a = b – c) and set measurement arm to this dimension.

Dimension "b"= 20.3 mm

Continue: E25/1 Fig.: E23/2



KMK02297

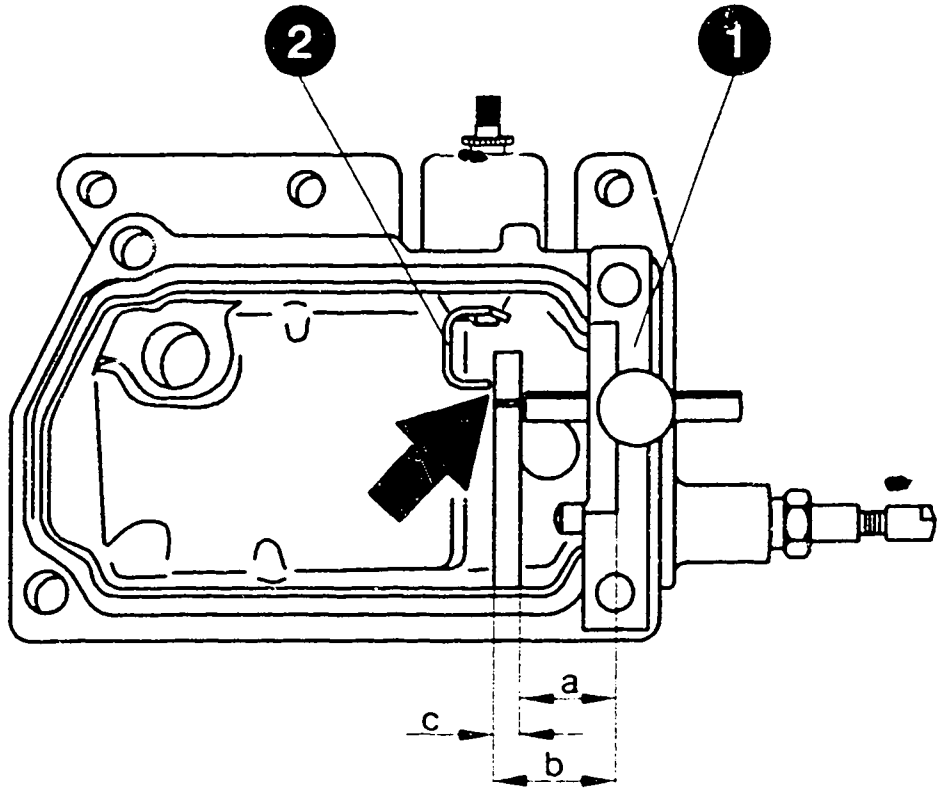
ADJUSTING STOP/REGULATING LEVER

* Special version A

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow).

Continue: E26/1 Fig.: E25/2



KMK02297

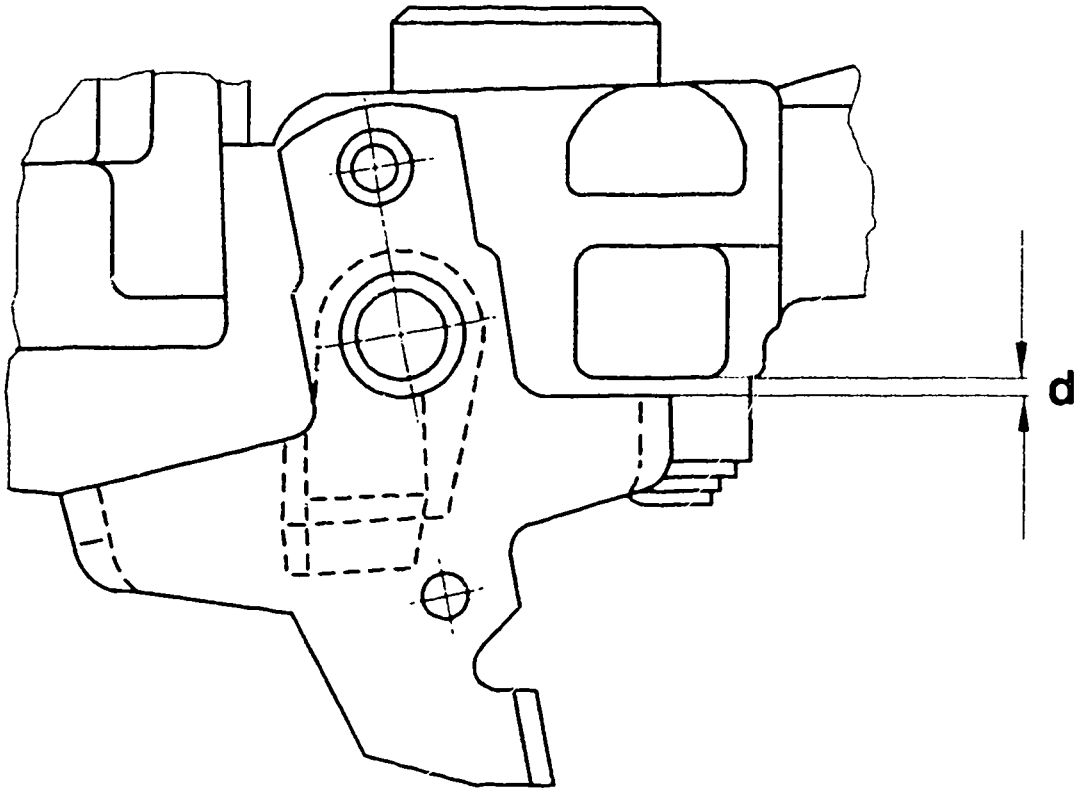
ADJUSTING STOP/REGULATING LEVER

* Special version A

Position stop lever on setting shaft such that dimension "d" between lever and housing stop is max. 2.0 mm.

Should dimension not be attained, slightly reduce dimension "b" = 20.3 mm.
Engage spring.
Press lever in direction of housing stop and simultaneously tighten hexagon nut on setting shaft to tightening torque of 5...10 Nm.

Continue: F06/1 Fig.: E26/2



KMK02299

ADJUSTING STOP/REGULATING LEVER

* Special version B

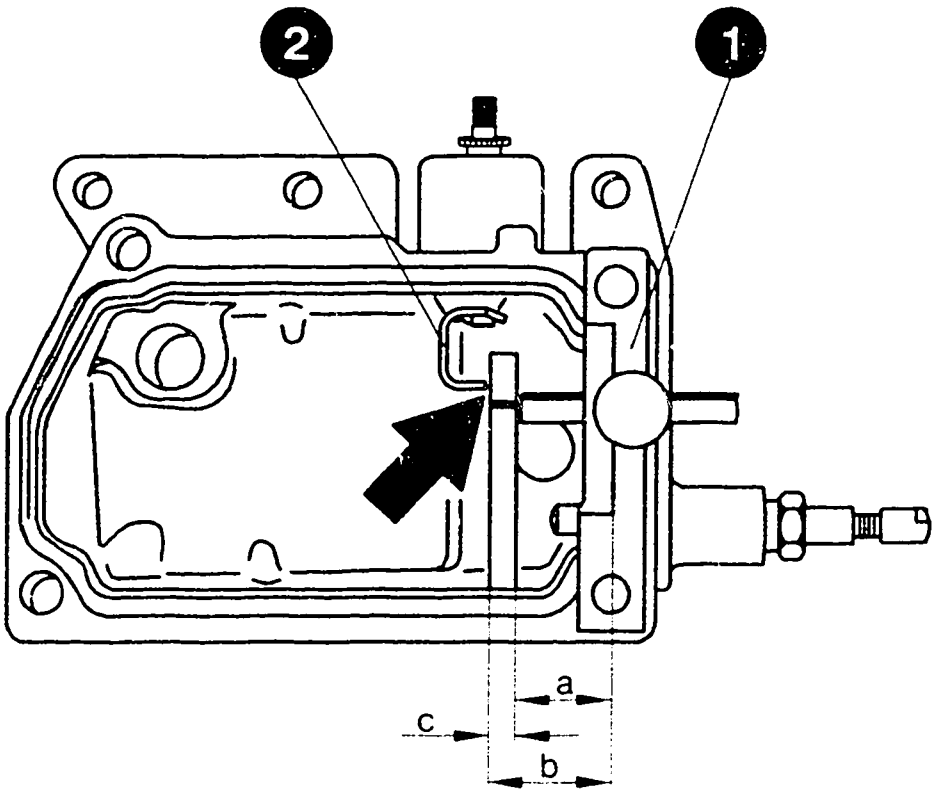
1 = Measurement tool
2 = Regulating lever

Attach KDEP 1152/3 to housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a = b – c) and set measurement arm to this dimension.

Dimension "b" = 20.3 mm

Continue: E28/1 Fig.: E27/2



KMK02297

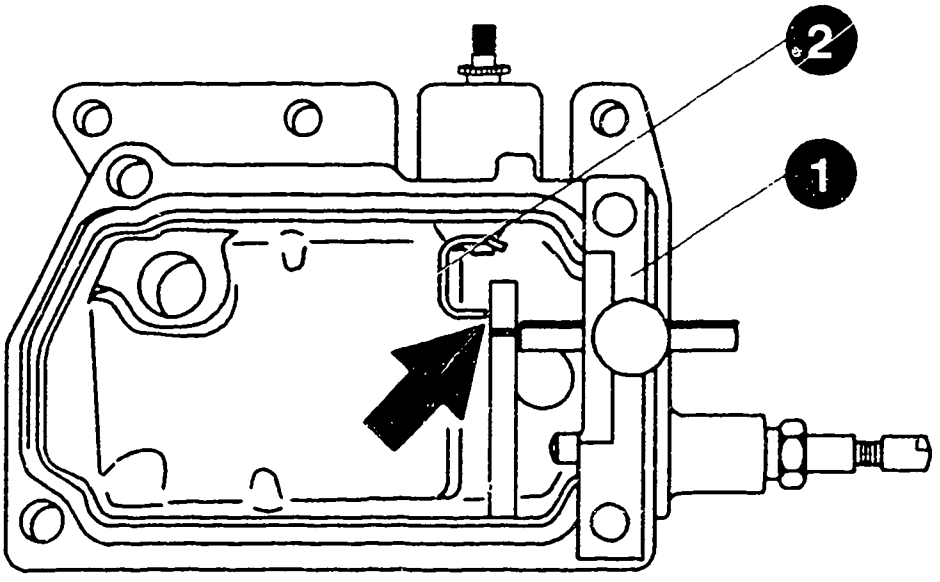
ADJUSTING STOP/REGULATING LEVER

* Special version B

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow).

Continue: F01/1 Fig.: E82/2



KMK02300

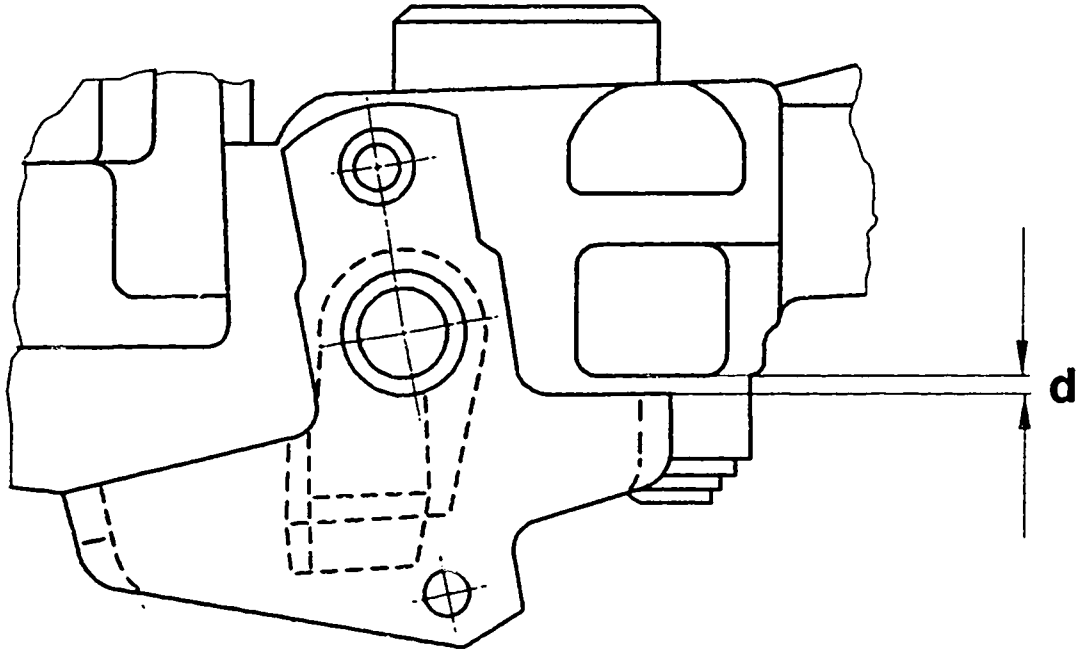
ADJUSTING STOP/REGULATING LEVER

* Special version B

Position stop lever on setting shaft such tht dimension "d" between lever and housing stop is max. 2.0 mm.

If dimension is not attained, slightly reduce dimension "b" = 20.3 mm.
Engage spring.
Press lever in direction of housing stop and simultaneously tighten hexagon nut on setting shaft to tightening torque of 5...10 Nm.

Continue: F06/1 Fig.: F01/2



KMK02301

ADJUSTING STOP/REGULATING LEVER

* With negative torque control

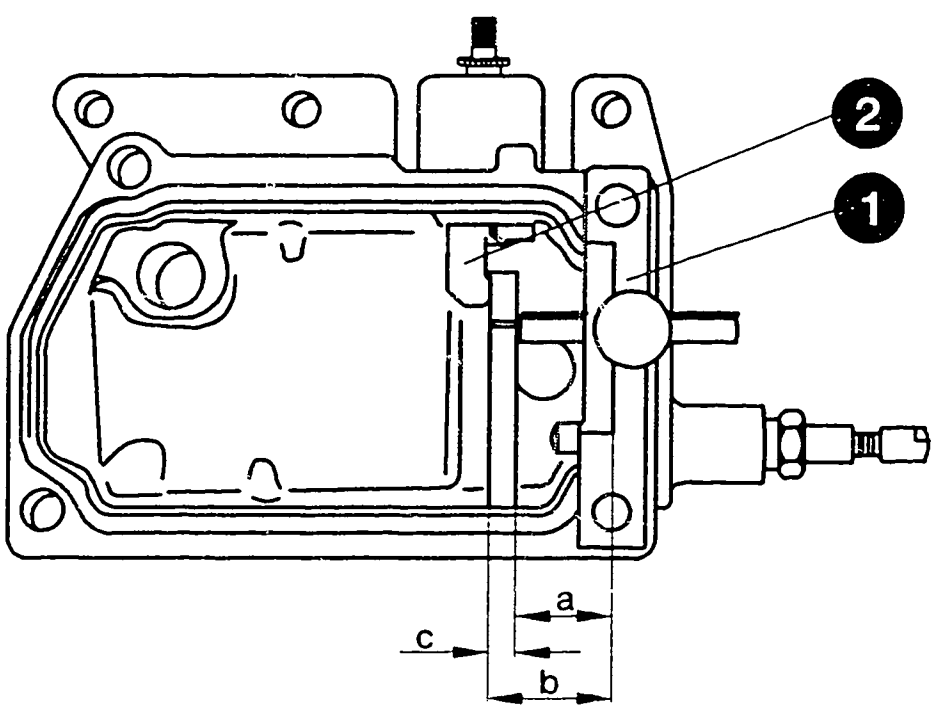
1 = Measurement tool
2 = Regulating lever

Attach KDEP 1152/3 to housing cover; determine and note down dimension "c" (thickness of measurement arm).

Calculate dimension "a" (a = b – c) and adjust measurement arm to this dimension.

Dimension "b" = 28.8 mm

Continue: F03/1 Fig.: F02/2



KMK02296

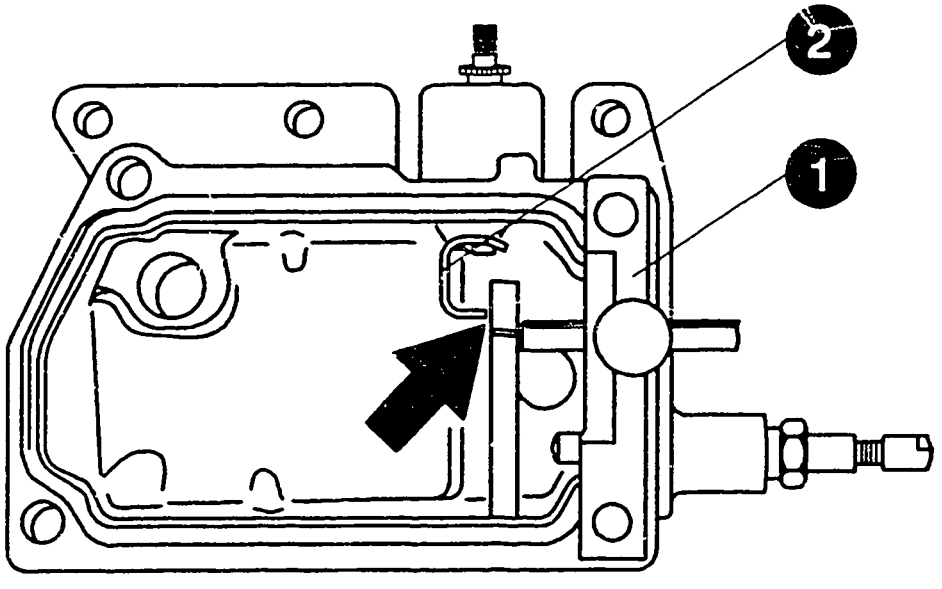
ADJUSTING STOP/REGULATING LEVER

* With negative torque control

1 = Measurement tool
2 = Regulating lever

Clamp measurement tool KDEP 1152/3 in this position and press regulating lever against measurement arm (arrow).

Continue: F04/1 Fig.: F03/2



KMK02300

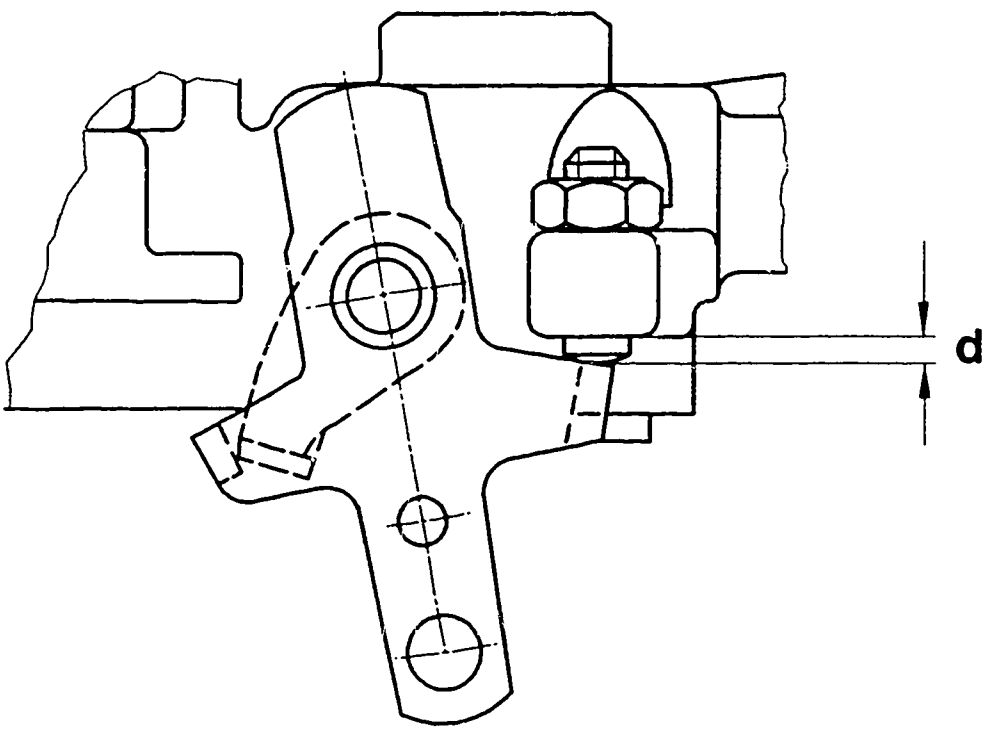
ADJUSTING STOP/REGULATING LEVER

* With negative torque control

Position stop lever on setting-shaft toothing such that dimension "d" between lever and housing stop is as small as possible.

Engage spring.
Press stop lever in direction of housing stop and simultaneously tighten hexagon nut on setting shaft.
Tightening torque 5...10 Nm.

Continue: F05/1 Fig.: F04/2



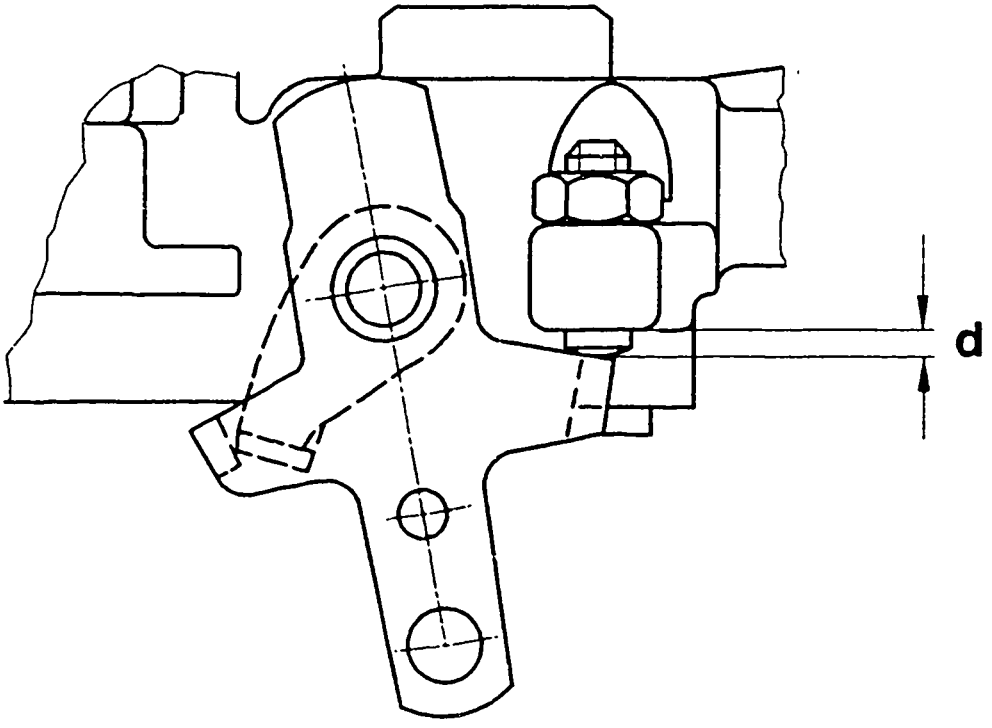
KMK02302

ADJUSTING STOP/REGULATING LEVER

* With negative torque control

Close stop screw on stop lever (dimension "d") and tighten lock nut to tightening torque of 6...9 Nm.

Continue: F06/1 Fig.: F05/2



KMK02302

MEASURING STARTING FUEL DELIVERY

Move control lever from idle stop to rated-speed stop.
Note:
In the event of deviation e.g. position control lever at idle stop, indication is given under Remarks in test-specification sheet.
Measure starting fuel delivery.

Continue: F06/2

MEASURING STARTING FUEL DELIVERY

If starting fuel delivery is not attained, check sleeve-starting travel "MS dimension" in accordance with Section "Calibration work".
For calibration work refer to
Coordinate H21/1

If necessary, increase MS dimension (indication on test-specification sheet).
If starting fuel delivery is attained, check idle and full-load speed regulation.

Work through other causes as per repair instructions.

Continue: F07/1

FITTING FULL-LOAD STOP

Select assembly in accordance with following types of sealing:

Lead seal with sleeve
Coordinate F08/1

Lead seal with plastic caps
Coordinate F10/1

Continue: F08/1

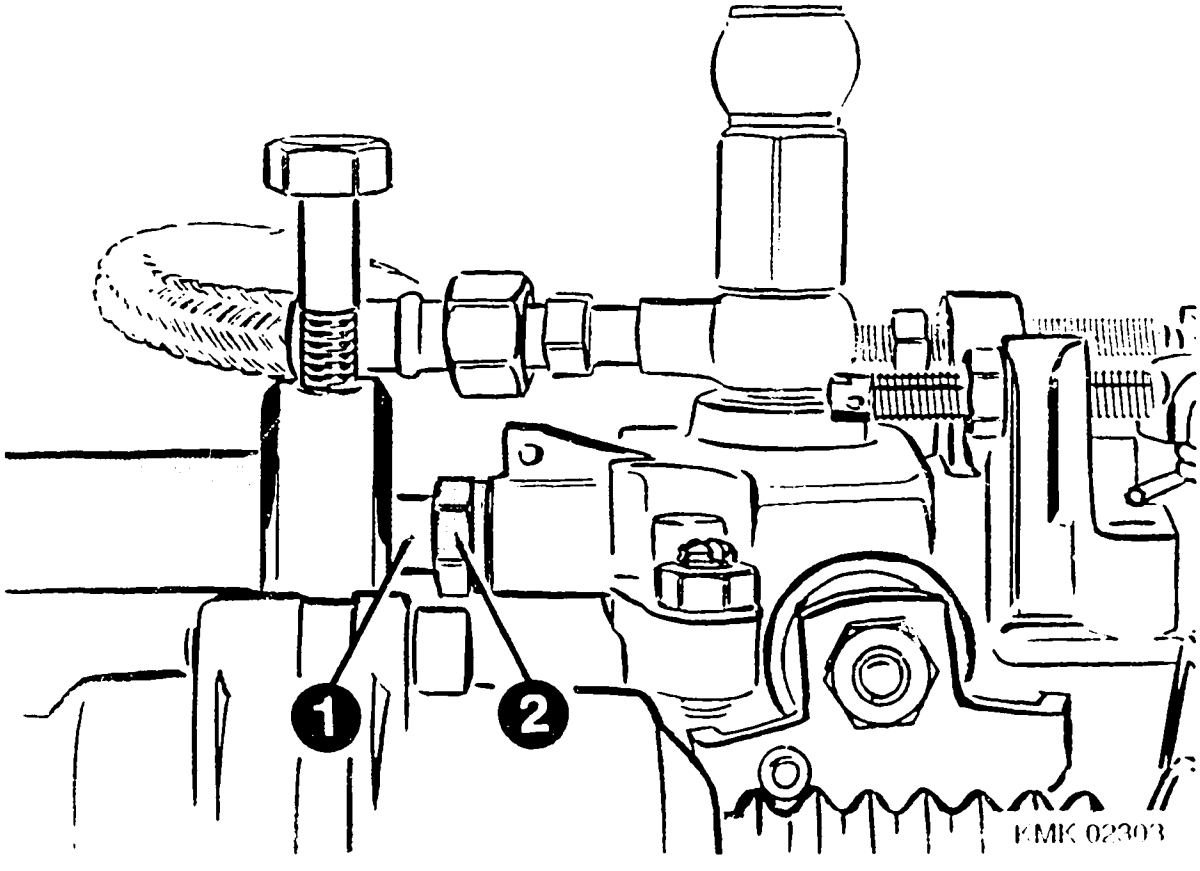
FITTING FULL-LOAD STOP
* Locking-sleeve version

1 = Locking sleeve
2 = Hexagon nut

Slip new locking sleeve (for locking full-load screw) onto threaded pin until it makes contact with hexagon nut.

Guide stamping tool KDEP 1106 over threaded pin and locking sleeve until it makes contact with hexagon nut.

Continue: F09/1 Fig.: F08/2

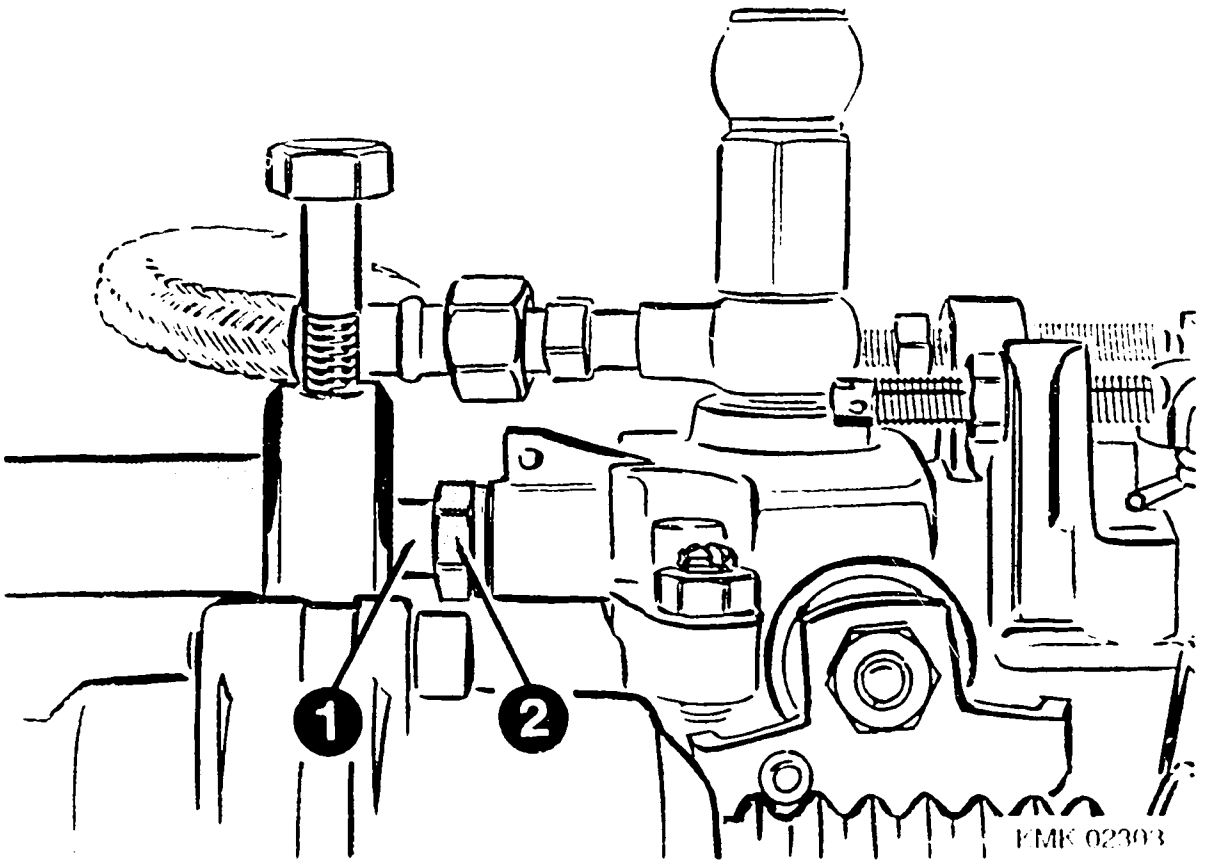


FITTING FULL-LOAD STOP
* Locking-sleeve version

1 = Spacer sleeve
2 = Hexagon nut

Screw in stamping screw by hand until it makes contact with locking sleeve; turn on a further 1 1/2 turns with open-ended wrench.
Remove stamping tool.
The max. gap between locking sleeve and hexagon nut is 0.3 mm.

Continue: F12/1 Fig.: F09/2



FITTING FULL-LOAD STOP
 * Version with sealing cap

1 = Full-load adjusting screw
2 = Lock nut with identification groove
3 = Sealing cap

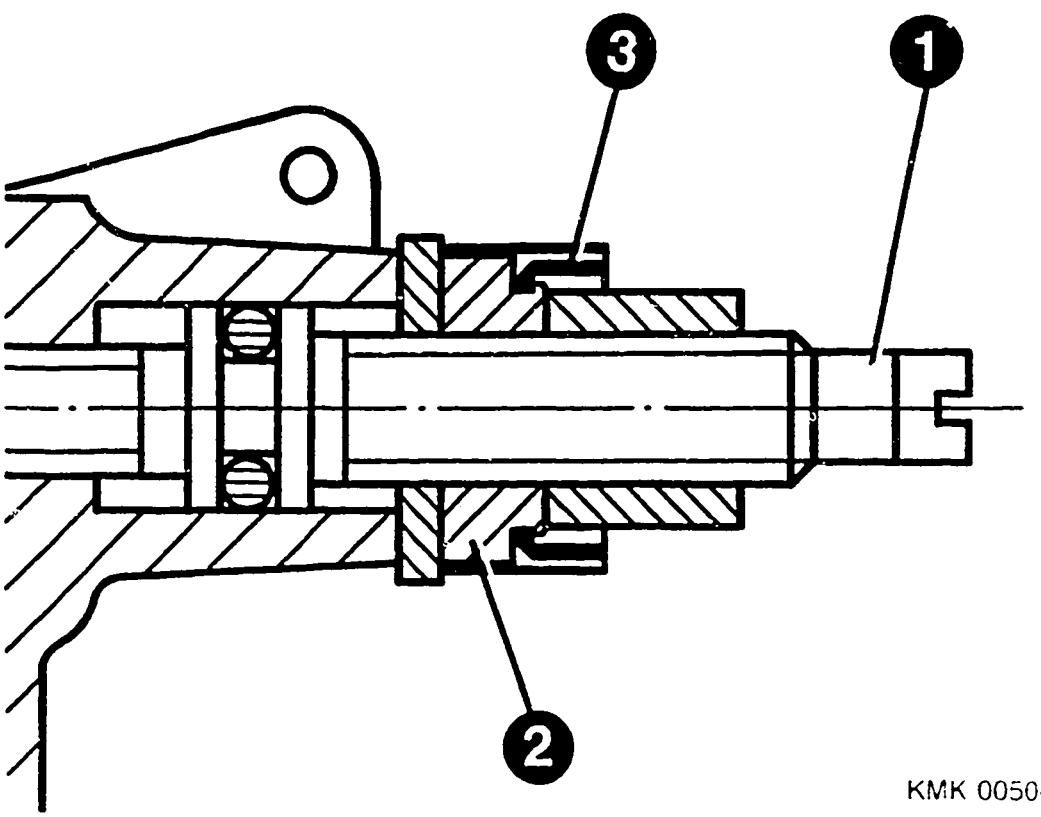
Full-load adjusting screw:

Hexagon nut M8	Sealing cap (red)
1 463 315 306	1 460 591 313

Adjusting screw, upper rated speed:

Hexagon nut M6	Sealing cap (red)
1 463 315 307	2 420 580 005

Continue: F11/1 Fig.: F10/2



KMK 00504

FITTING FULL-LOAD STOP
 * Version with sealing cap

Press on sealing cap as follows

Position inside diameter of sealing
cap in sealing tool.
Press cap by means of assembly tool
into groove in lock nut.
Cap must engage.

Tools required:
* KDEP 1187 for full-load adjusting
  screw
* KDEP 1188 for rated-speed
  adjusting screw

Continue: F12/1

F11 —

ADJUSTING ADD-ON MODULES

Select adjustment sequence in accordance with following add-on modules:

	Coordinate
* Adjusting temperature-dependent excess fuel quantity (TAS)	F15/1
* Adjusting temperature-dependent idle increase (TLA) by way of cam roller ring KSB	F20/1
* Temperature-dependent idle increase acting on housing-fixed idle spring	G01/1

Continue: F12/2

ADJUSTING ADD-ON MODULES

Select adjustment sequence in accordance with following add-on modules:

	Coordinate
* Pump with vacuum control valve: Adjusting part-load stop for exhaust gas recirculation	G03/1
* Adjusting EGR switching valve	G05/1
* Checking and adjusting angular position	G16/1

Continue: F13/1

ADJUSTING START OF DELIVERY

Select adjustment sequence in accordance with following characteristics:

	Coordinate
* Pointer and marking plate	G19/1
* Notched plate	G23/1
* Adjusting start of delivery Blocking of drive shaft with locking screw	G27/1

Continue: F13/2

CONTROL LEVER ASSIGNMENT

Select adjustment sequence in accordance with lever system:

	Coordinate
* Control-lever system, 2-piece: Control-lever position (XK) adjustment	H08/1
(XL) adjustment Stamping control lever Checking full-load delivery	
* Calibration work, MS dimension	H21/1
Lever for spring-actuated power on/off damper	J03/1

Continue: F14/1

CONTROL LEVER ASSIGNMENT

Select adjustment procedure in accordance with following lever systems:

	Coordinate
* Control lever, 1-piece:	
– Adjusting control-lever position	
(A)	H16/1
(B)	H20/1

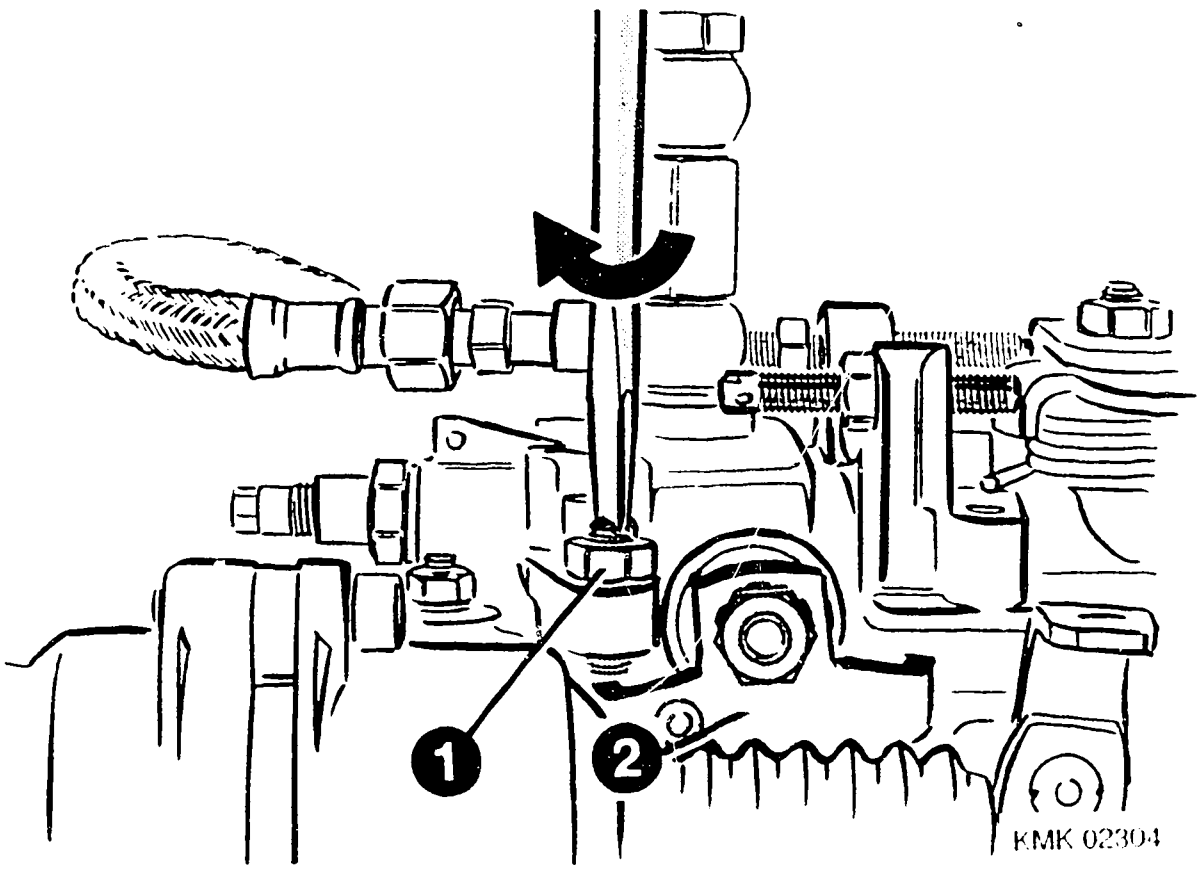
Continue: F15/1

ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Threaded pin
2 = Regulating lever

Position speed-control lever at rated-speed adjusting screw.
Completely screw back threaded pin.
Press regulating lever (as far as pressure point at fulcrum lever) in direction of distributor head.
This causes the starting spring to make contact with the fulcrum lever.
Do not overpress fulcrum lever.
Hold regulating lever in this position.

Continue: F16/1 Fig.: F15/2

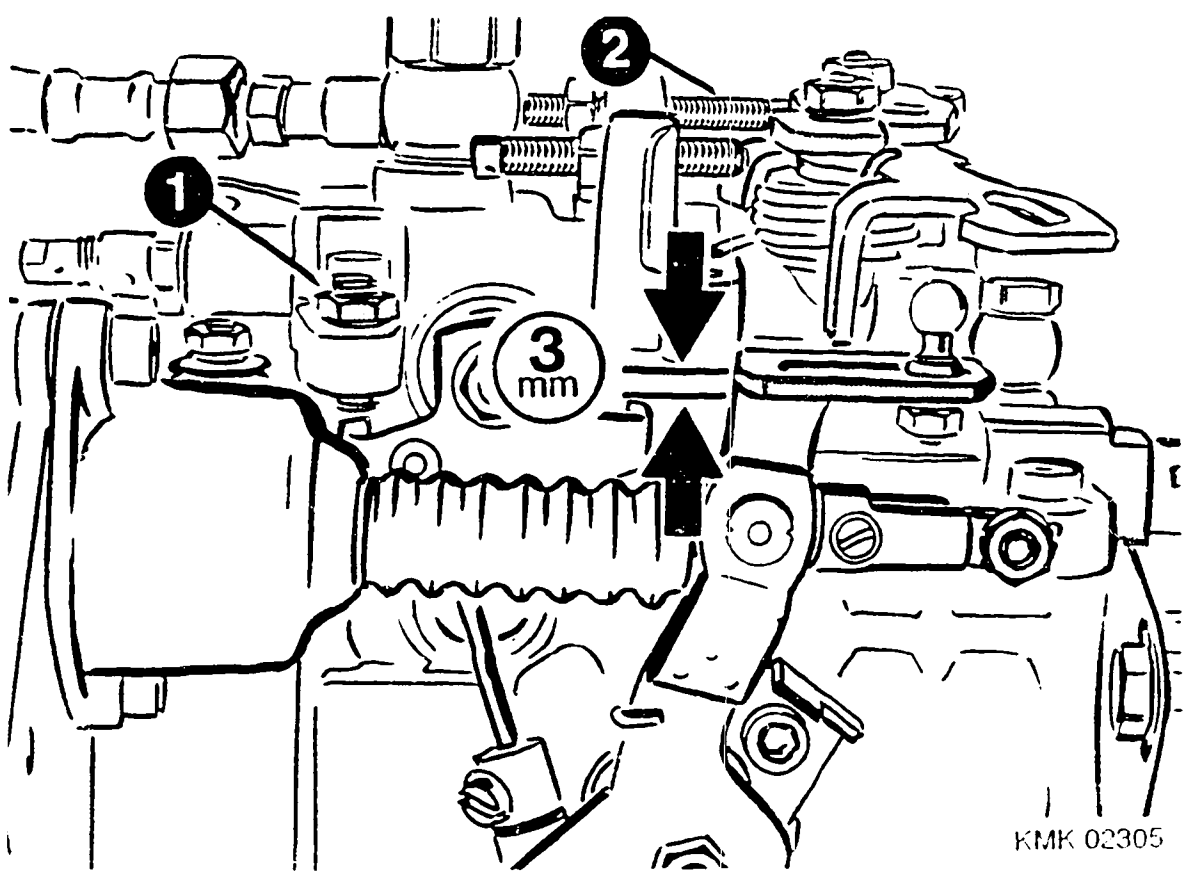


ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Threaded pin
2 = Idle adjusting screw

Screw threaded pin in until it makes contact with regulating lever.
Continue turning threaded pin in direction of regulating lever 1/4 - 1/2 of a turn.
Distance between regulating lever and housing stop must be at least 3 mm.
Tighten lock nut to 6...9 Nm.
Position speed-control lever at idle adjusting screw.

Continue: F17/1 Fig.: F16/2

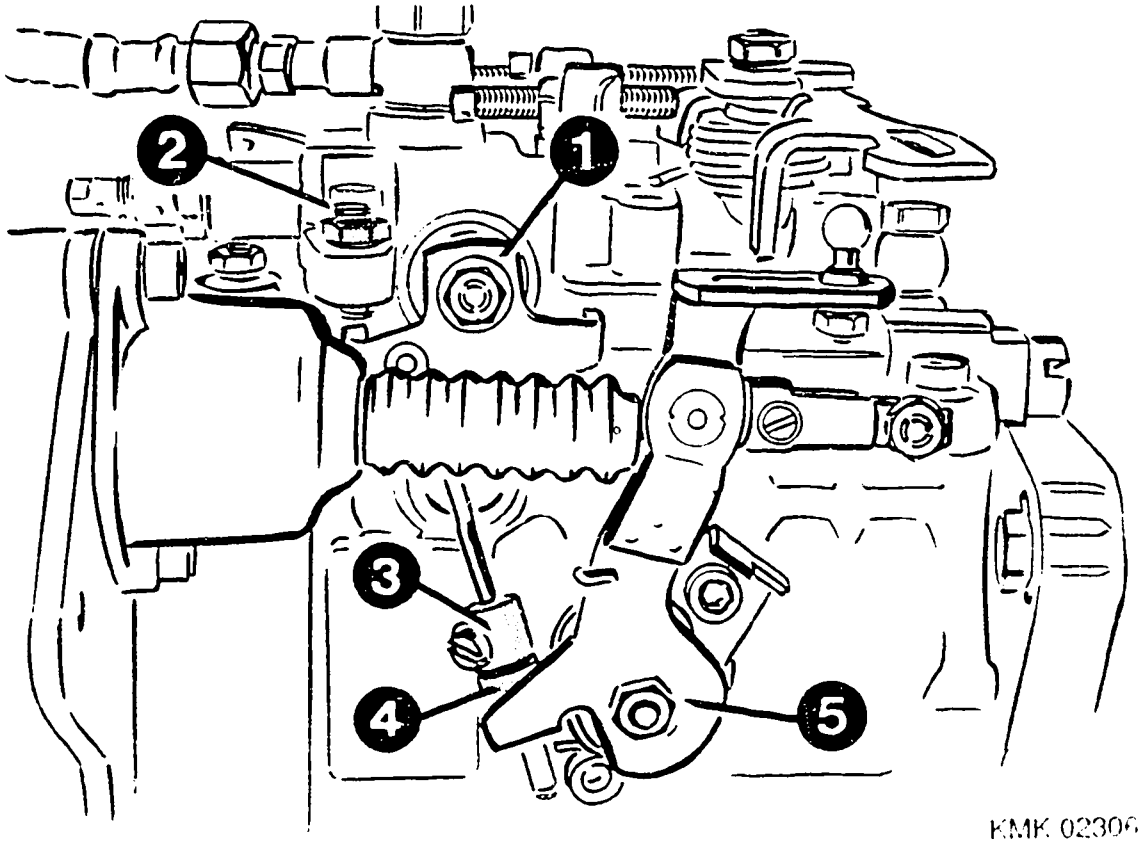


ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Regulating lever
2 = Threaded pin
3 = Clamp bushing
4 = Locating pin
5 = Speed-control lever

Position regulating lever at threaded pin.
Fix regulating lever in this position.
Engage clamp bushing with locating pin in control lever; to do so, press control lever in direction of distributor head.
Position control lever at stop bracket.

Continue: F18/1 Fig.: F17/2



KMK 02306

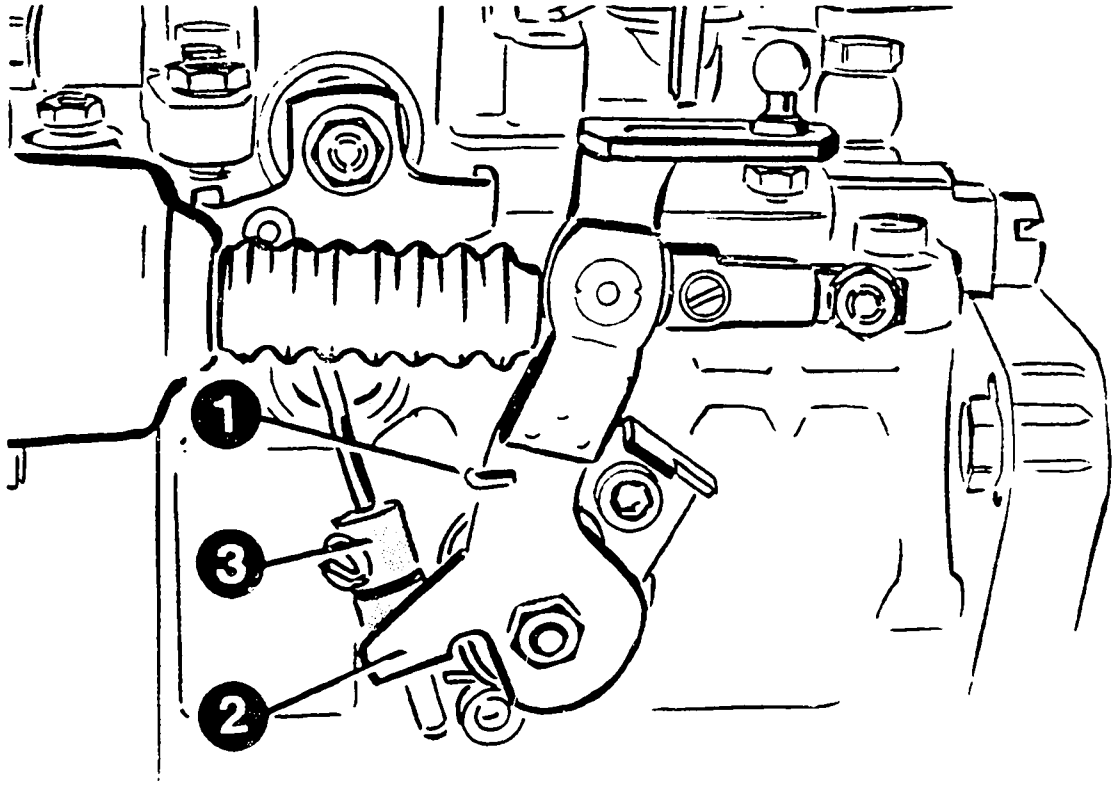
ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Cylindrical helical coiled spring
2 = Control lever
3 = Clamp bushing

Control lever must be in contact with stop bracket for following operation.

Engage cylindrical helical coiled spring in control lever.

Continue: F19/1 Fig.: F18/2



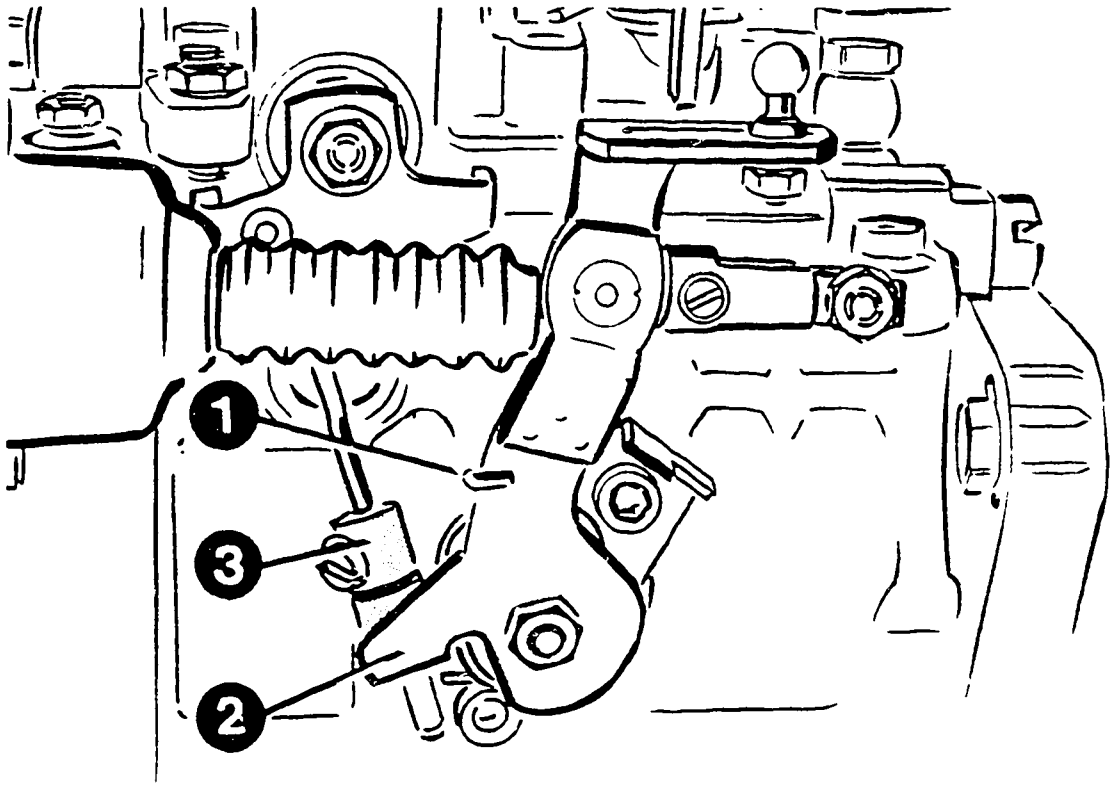
KMK 02307

ADJUSTING TEMPERATURE-DEPENDENT EXCESS FUEL QUANTITY

1 = Cylindrical helical coiled spring
2 = Control lever (regulating lever)
3 = Clamp bushing

Press connecting rod against regulating lever.
Press clamp bushing against control lever and tighten fillister-head screw.
Disengage cylindrical helical coiled spring from control lever.

Continue: F12/1 Fig.: F19/2



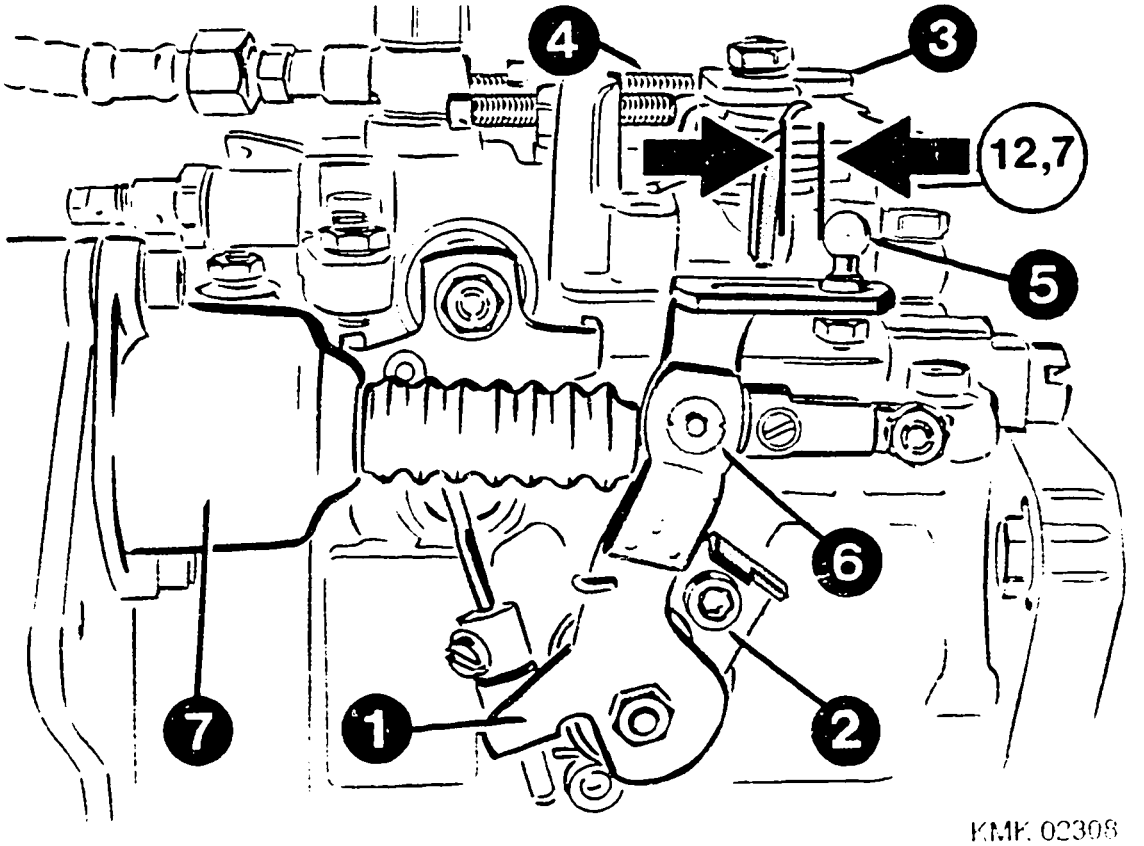
KMK 02307

ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE (TLA) BY WAY OF CAM ROLLER RING

1 = Control lever
2 = Stop bracket
3 = Speed-control lever
4 = Idle adjusting screw

Position control lever at stop bracket. Speed-control lever makes contact with idle adjustment screw.

Continue: F21/1 Fig.: F20/2

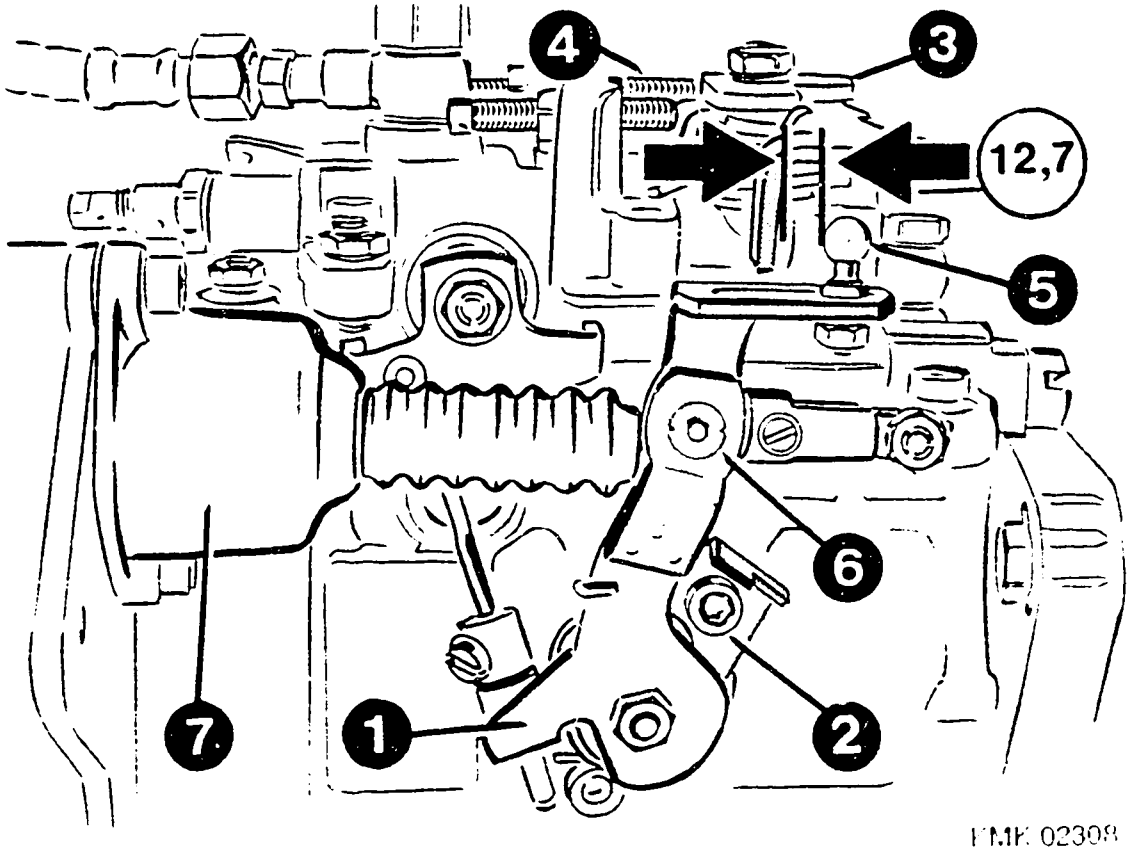


ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE (TLA) BY WAY OF CAM ROLLER RING

5 = Ball stud
6 = Intermediate piece
7 = Control device

Set ball stud such that it is 12.7 mm from speed-control lever (refer to test-specification sheet for deviation).
Insert intermediate piece into control lever.
Insert cable of control device into hole in intermediate piece.
Completely install control device at distributor head. Screw in and tighten fastening screws.

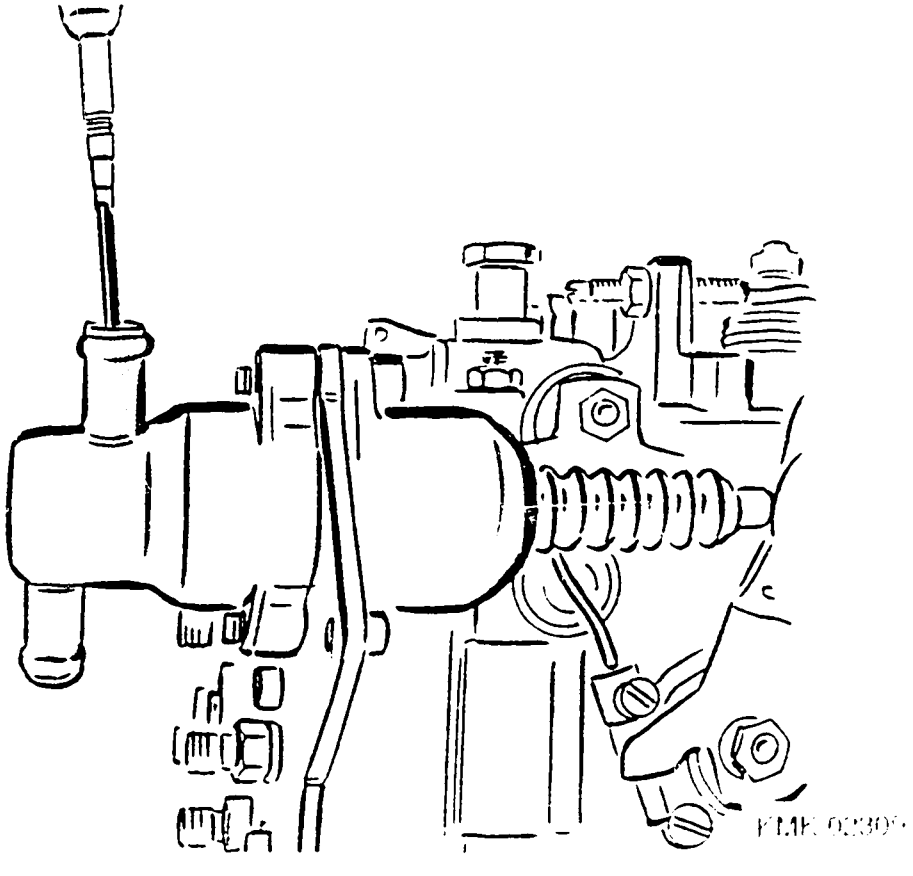
Continue: F22/1 Fig.: F21/2



ADJUSTING CONTROL DEVICE
 * Determining KSB stroke

Slip intermediate piece and clamping piece onto cable.
 * Determine temperature of control device (2 posibilities)
 a) Measurement with electronic temperature gauge.
Determine temperature of control device with commercially available electronic temperature gauge.
To do so, place sensor in control device (picture).
Transfer temperature determined to graph and read off KSB stroke set value.

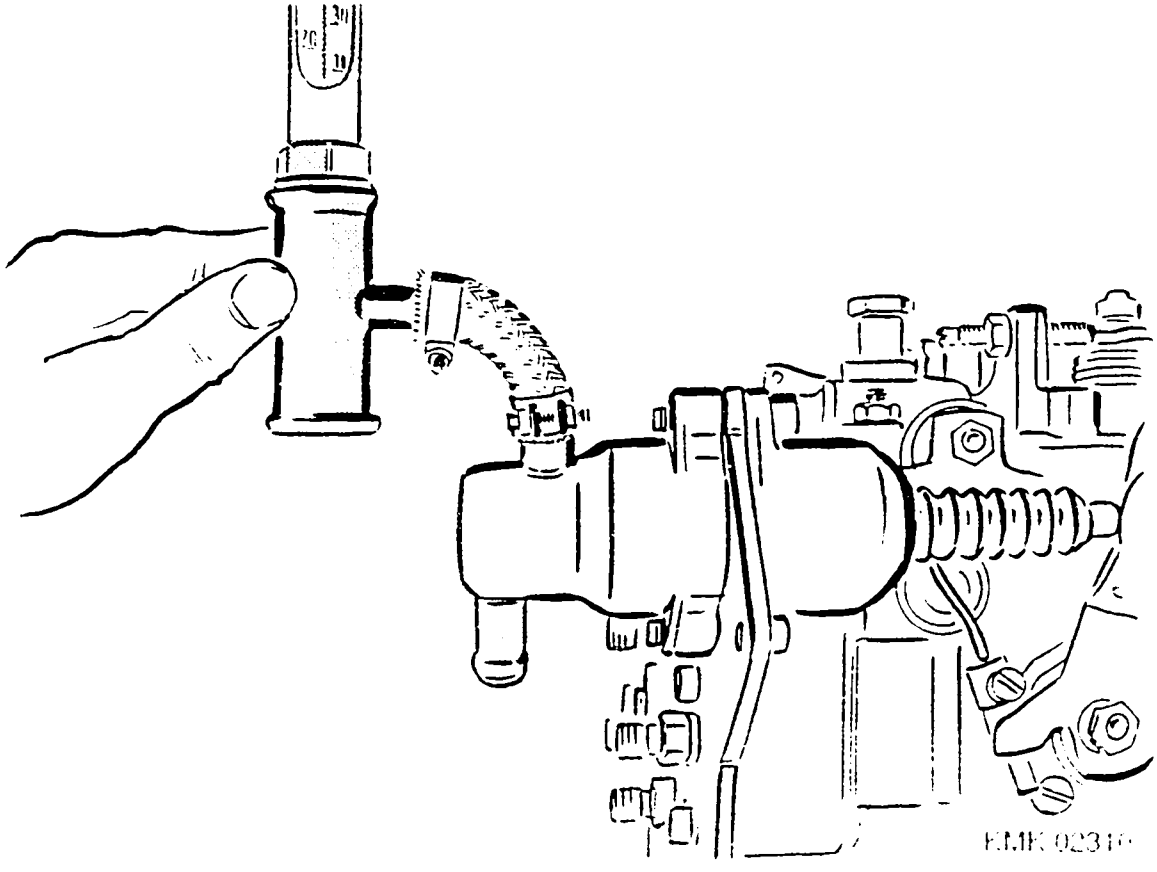
Continue: F23/1 Fig.: F22/2



ADJUSTING CONTROL DEVICE
* Determining KSB stroke
b) Measurement with thermometer

Remove pump from test bench and clamp to clamping frame KDEP 2919.
Connect up thermometer KDEP 2742 to control device with appropriate tubing.
Guide return hose of control device into vessel.
Flush water chamber of control device with warm water (approx. 50°C).
Read temperature off thermometer.
Transfer temperature determined to graph and read off KSB stroke set value.

Continue: F24/1 Fig.: F23/2



ADJUSTING CONTROL DEVICE

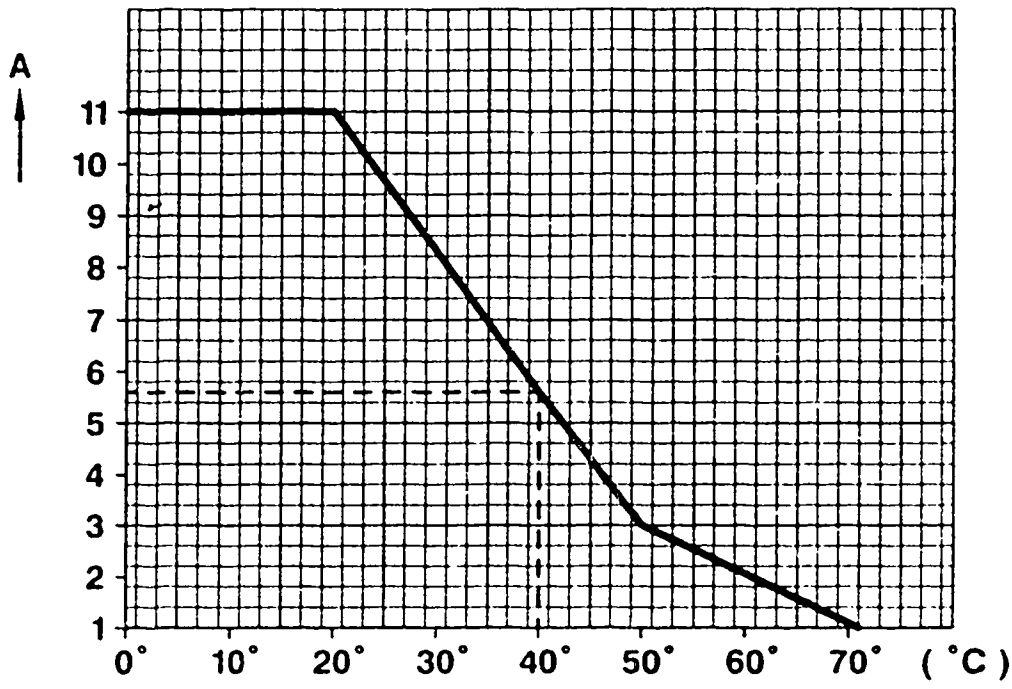
A = Stroke – KSB mm

Position temperature determined with thermometer at lower scale.

Read off required stroke from vertical scale on graph.

Example:
Temperature determined = 40°C
Stroke required = 5.7 mm

Continue: F25/1 Fig.: F24/2



KMK02311

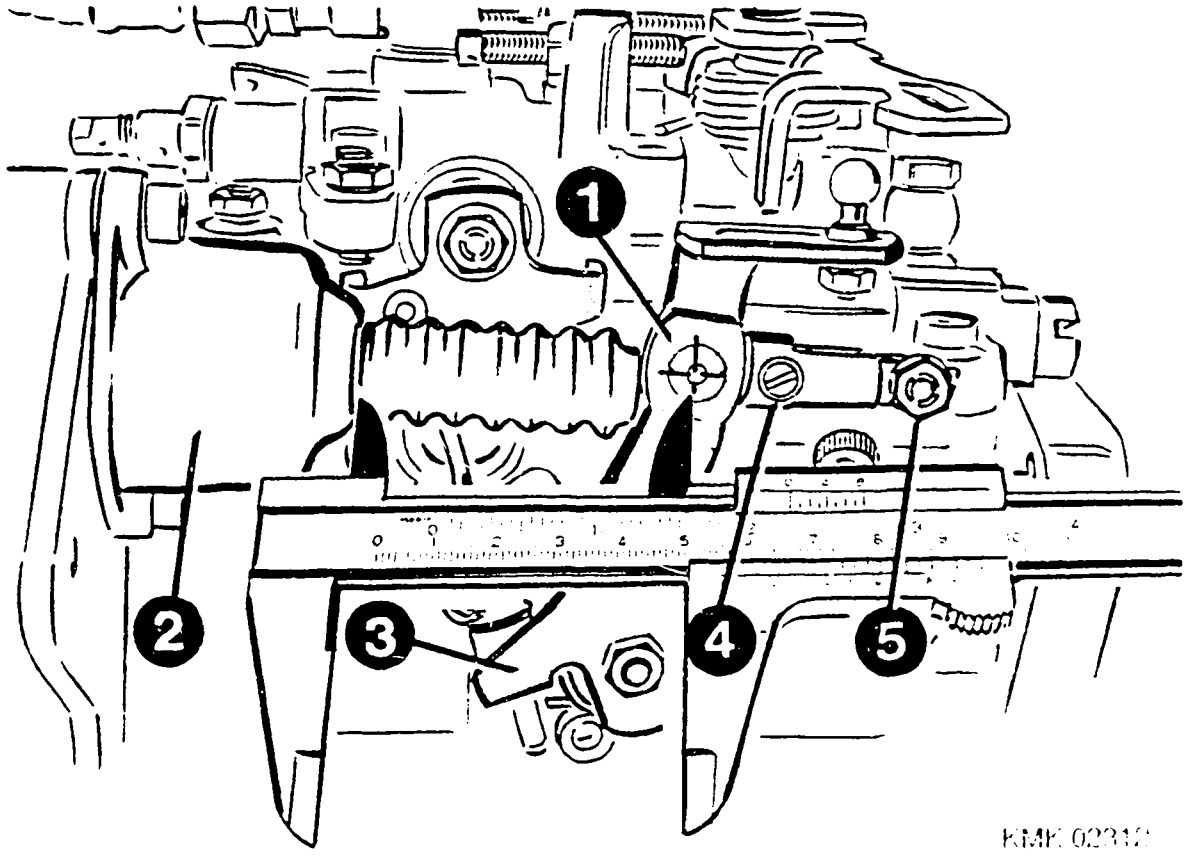
ADJUSTING CONTROL DEVICE

1 = Intermediate piece
2 = Control device
3 = Control lever

* Adjustment of control-device cable

Position control lever at cam roller ring.
Measure distance between center of intermediate piece and control device.
Subtract stroke determined from this dimension.
Set control lever to this new dimension (stroke required).

Continue: F26/1 Fig.: F25/2



ADJUSTING CONTROL DEVICE

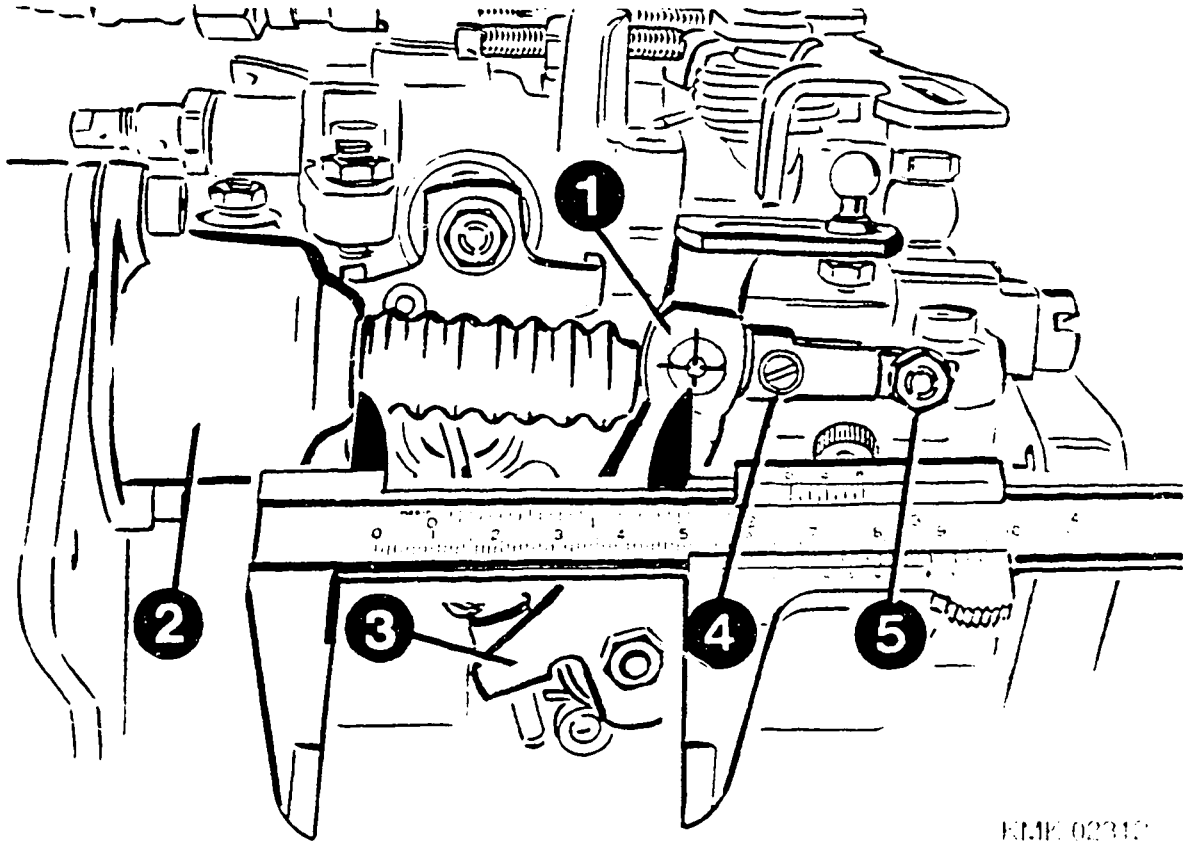
4 = Intermediate piece
5 = Clamping piece

* Control-device cable adjustment

Fix control lever in this position by way of intermediate piece and clamping piece.

Loosen intermediate piece and push in direction of control lever.

Continue: F27/1 Fig.: F26/2



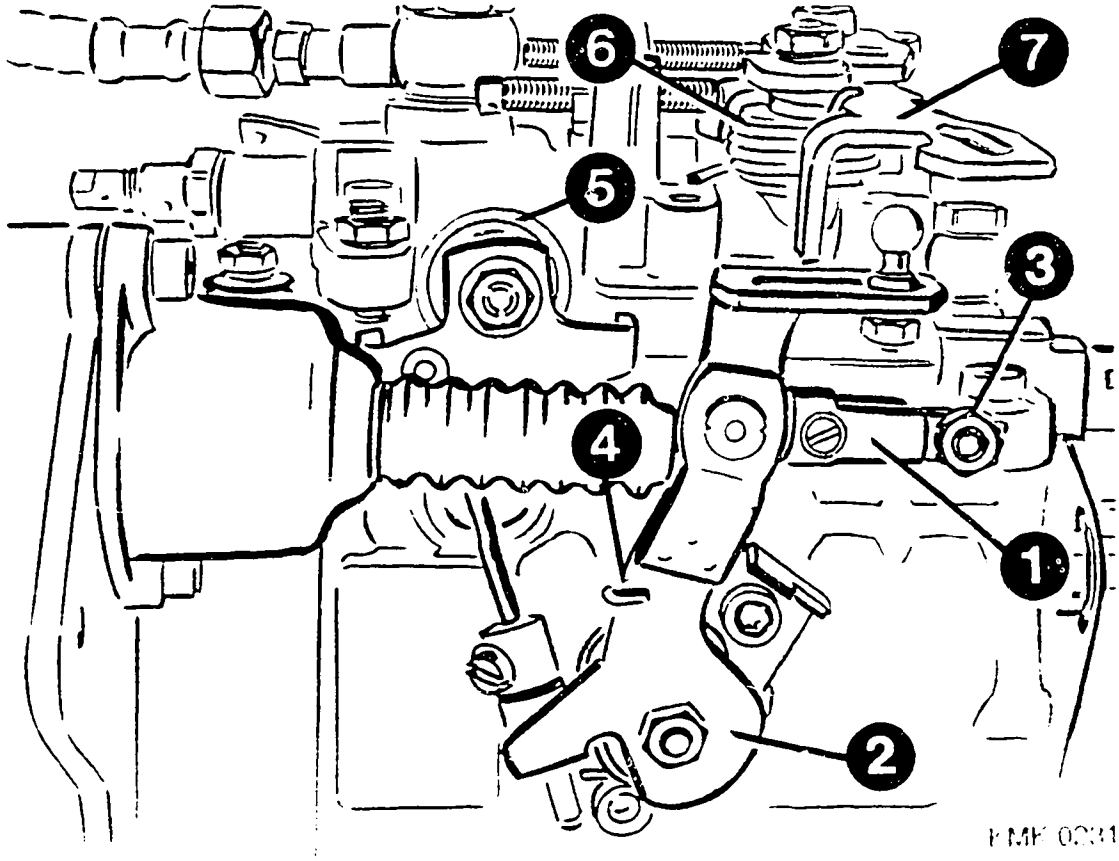
ADJUSTING CONTROL DEVICE

1 = Intermediate piece
2 = Control lever
3 = Clamping lever
4 = Cylindrical helical coiled spring (cam roller ring)
5 = Cylindrical helical coiled spring (regulating lever)

* Control-device cable adjustment

Turn intermediate piece through 90° and push in direction of clamping piece as far as stop.
Engage cylindrical helical coiled spring in control lever, cam roller ring.
Insert cylindrical helical coiled spring into hole in regulating lever.

Continue: F28/1 Fig.: F27/2



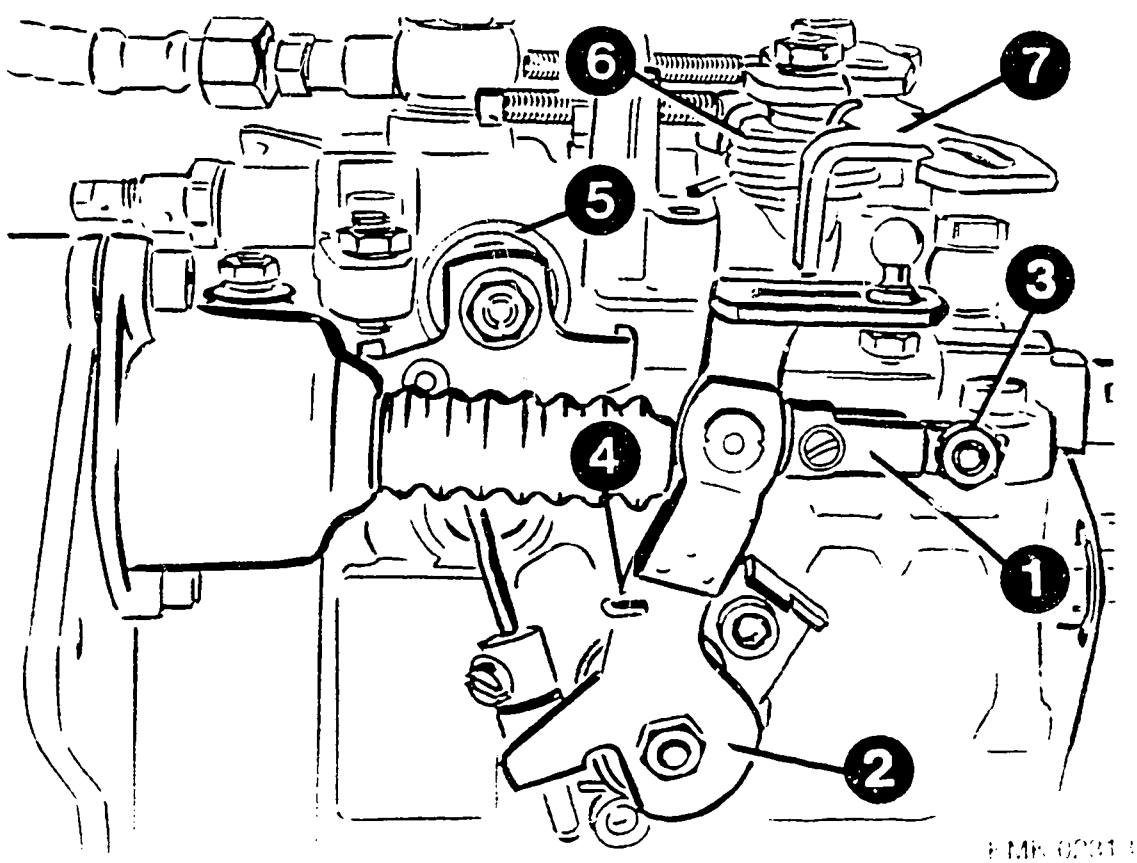
ADJUSTING CONTROL DEVICE

6 = Cylindrical helical coiled spring
(speed-control lever)
7 = Speed-control lever

Remove distributor-type fuel-injection pump from test bench and seal.

Attach distributor-type fuel-injection pump to engine in this position.

Continue: F12/1 Fig.: F28/2

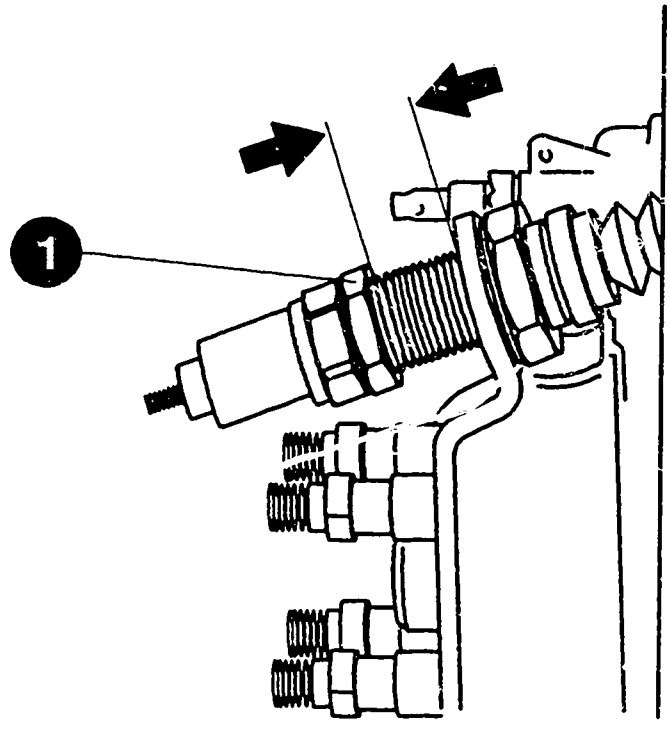


ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE ACTING ON HOUSING-FIXED IDLE SPRING

1 = Control housing

Prerequisite:
Pump completely adjusted.
Screw control housing (thermocouple support) into support bracket until basic dimension of 5.3...5.7 mm (distance between support bracket and hexagon nut of control housing) is attained.

Continue: G02/1 Fig.: G01/2



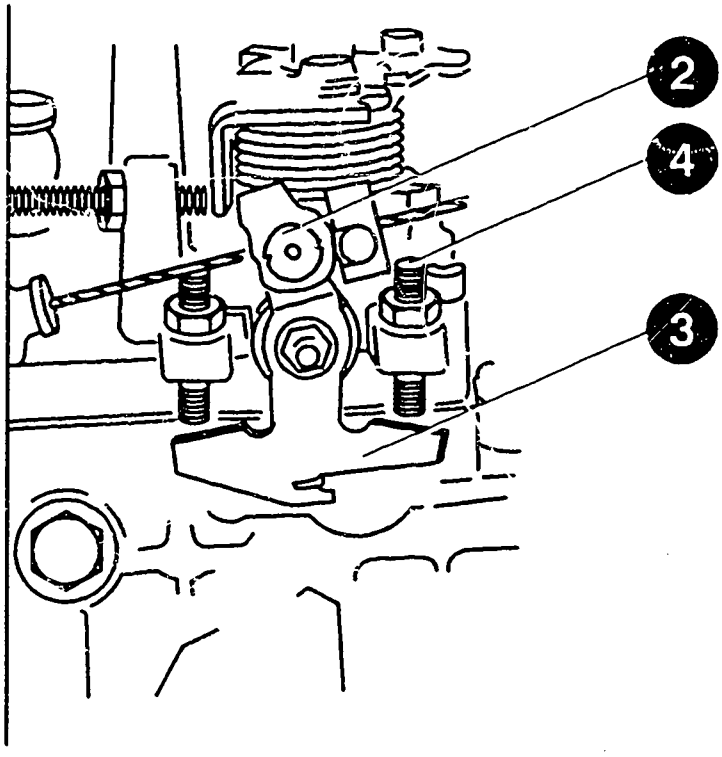
KMK02314

ADJUSTING TEMPERATURE-DEPENDENT IDLE INCREASE ACTING ON HOUSING-FIXED IDLE SPRING

2 = Intermediate piece
3 = LFG stop lever
4 = Stop screw for high idle

Thread tie rod into intermediate piece. Position LFG stop lever at stop for high idle.
Thread clamping piece into tie rod, press clamping piece against LFG stop lever and tighten clamping screw to 3.5...4.5 Nm.

Continue: F12/1 Fig.: G02/2



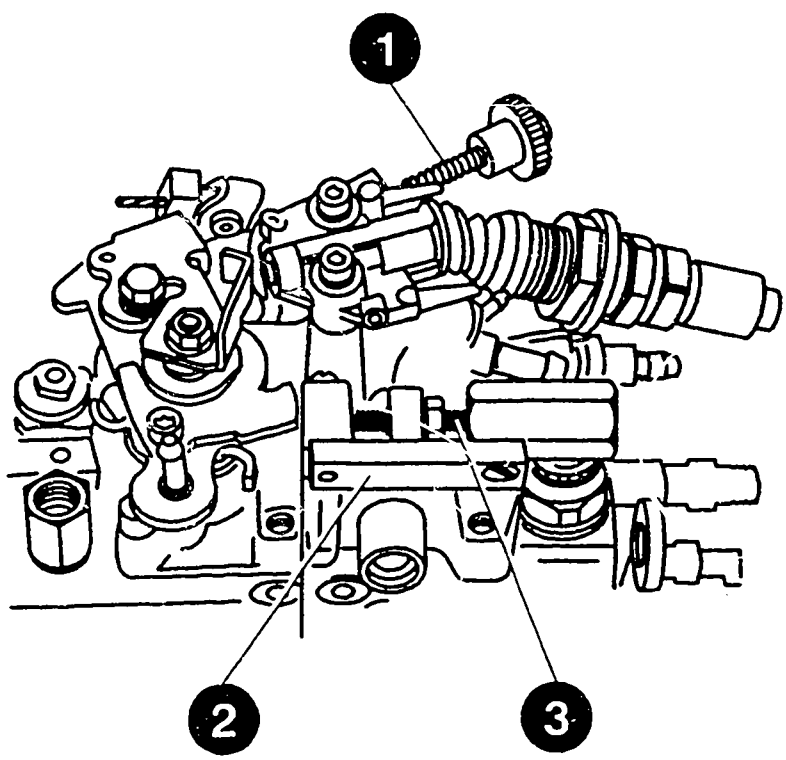
KMK02315

ADJUSTING PART-LOAD STOP FOR EGR

1 = Adjusting screw KDEP 1177
2 = Spacer KDEP 1176
3 = Adjusting screw, part-load stop

Insert adjusting screw KDEP 1177 between speed-control lever and rated-speed adjusting screw.
Slip spacer KDEP 1176 with spacing dimension 11.8 mm onto adjusting screw for part-load quantity.

Continue: G04/1 Fig.: G03/2



KMK02316

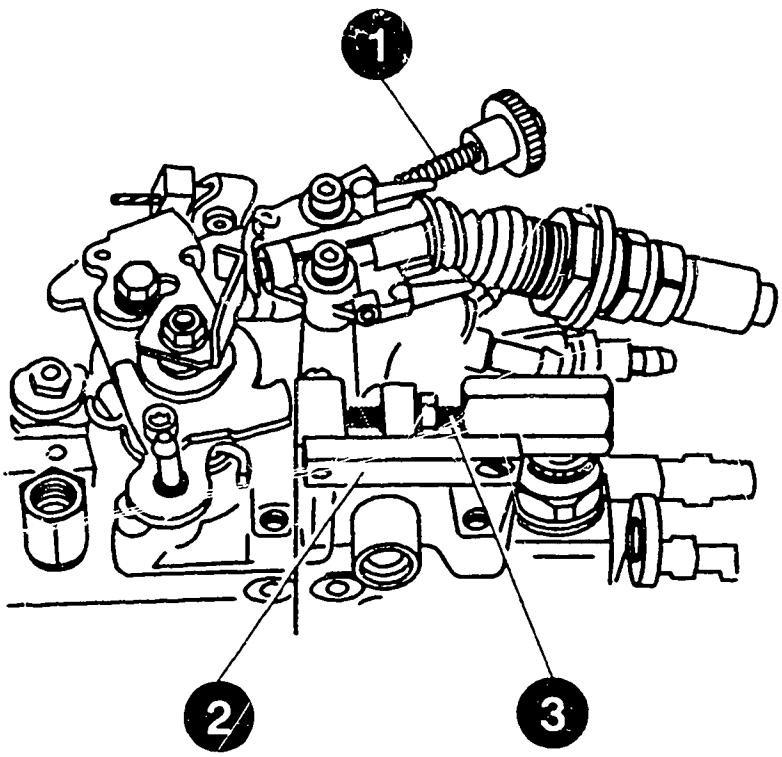
ADJUSTING PART-LOAD STOP FOR EGR

3 = Adjusting screw

Make up difference with respect to setting dimension (as per test-specification sheet) with feeler gauge. Position speed-control lever by way of knurled screw against spacer.

Approach speed for part-load quantity and adjust delivery by way of adjusting screw.

Continue: F12/1 Fig.: G04/2



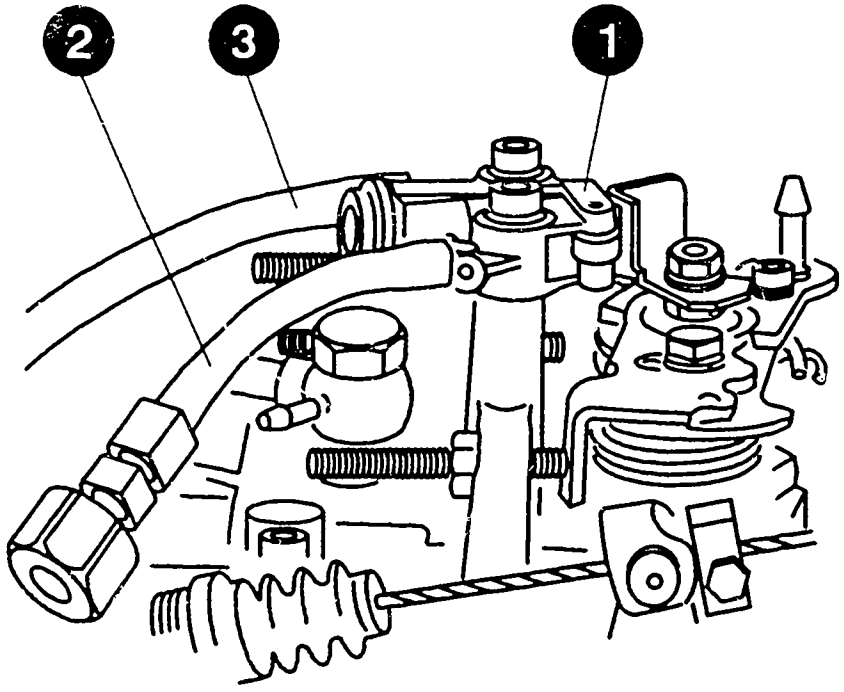
KMK02316

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

1 = Control valve
2 = Connection from ALDA tester
3 = Connection to vacuum gauge

Attach control valve to housing cover using prescribed tightening torque 2...3 Nm.
Externally seal pump (if necessary seal delivery-valve holder).
To provide tolerance compensation, apply 2500 hPa compressed air to pump.

Continue: G06/1 Fig.: G05/2



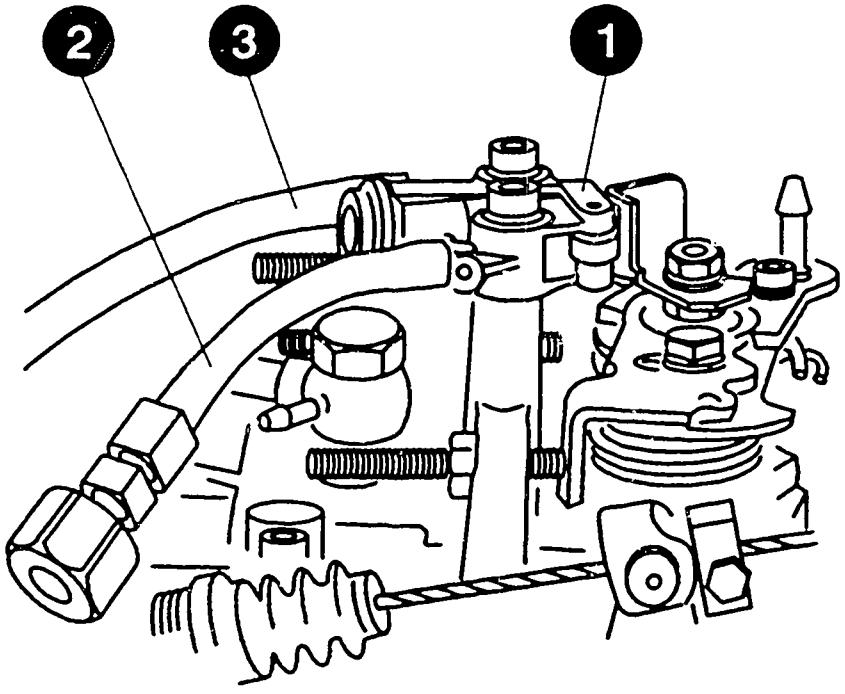
KMK02317

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

1 = Control valve
2 = Connection from ALDA tester
3 = Connection to vacuum gauge or Mityvac pump

Connect up connecting line from ALDA tester to marked connection "1" on control valve.
Attach connection "2" from pressure control valve to pressure/vacuum tester or Mityvac pump.

Continue: G07/1 Fig.: G06/2



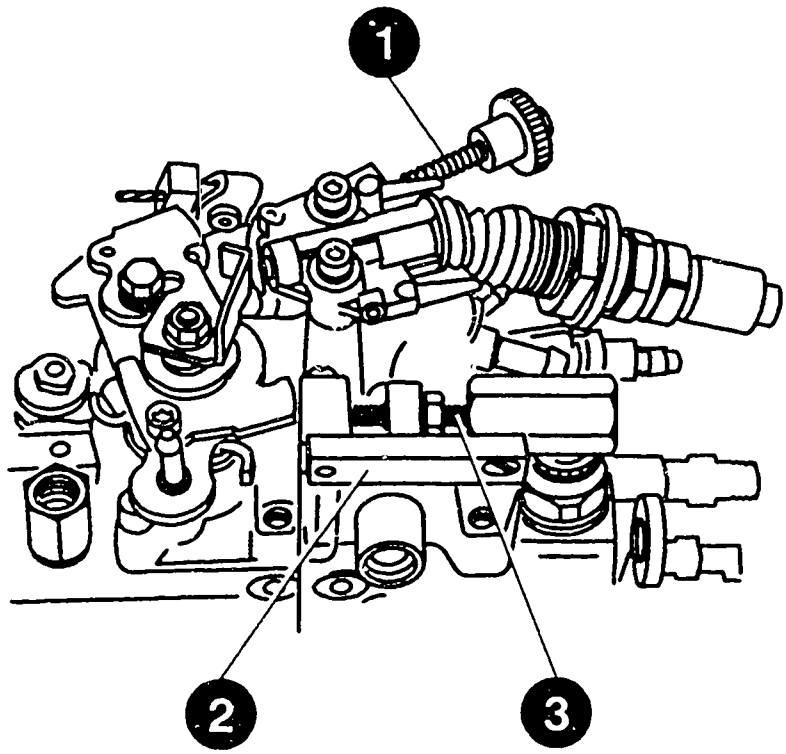
KMK02317

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

1 = Adjusting screw KDEP 1177
2 = Spacer KDEP 1176
3 = Adjusting screw, part-load quantity

Insert control lever KDEP 1177 between speed-control lever and rated-speed adjusting screw.
Slip spacer KDEP 1176 with spacing dimension 11.8 mm onto adjusting screw for part-load quantity.

Continue: G08/1 Fig.: G07/2



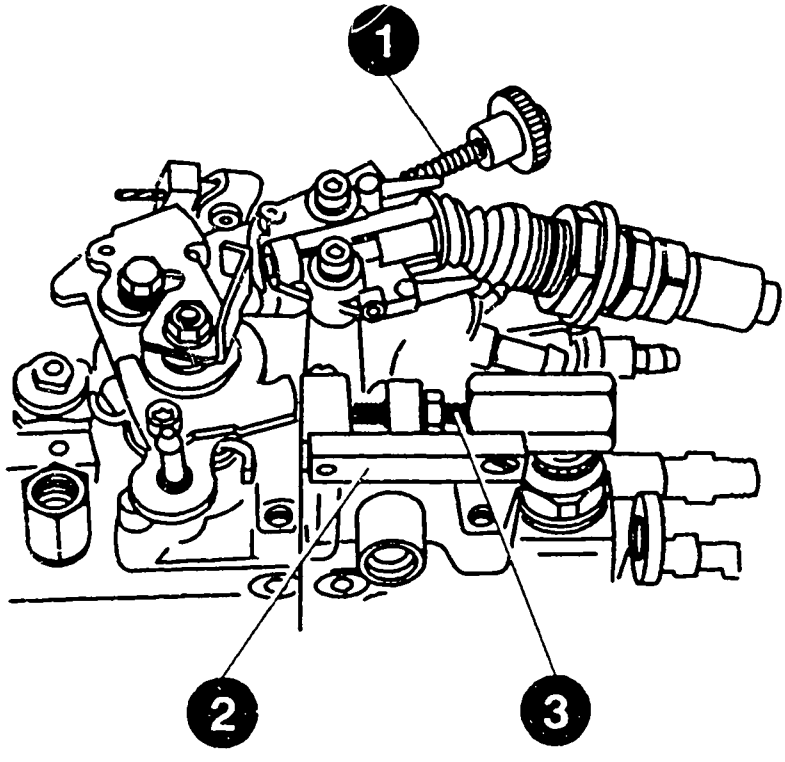
KMK02316

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

Position speed-control lever by way of knurled screw (arrow) at spacer.

Make up difference with respect to setting dimension (as per test-specification sheet) with feeler gauge.

Continue: G09/1 Fig.: G08/2



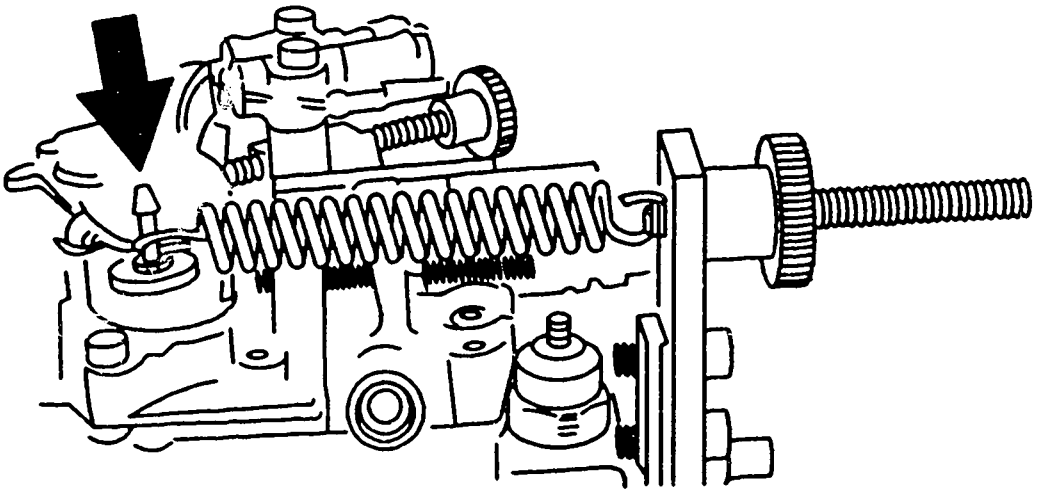
KMK02316

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

Arrow = Drive hub

Fit spring tensioner KDEP 1179 at support bracket.
Insert tension spring into drive hub at speed-control lever.
Screw in knurled nut as far as it will go and tension spring.
This suppresses the speed-control lever against the spacer.

Continue: G10/1 Fig.: G09/2



KMK02318

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

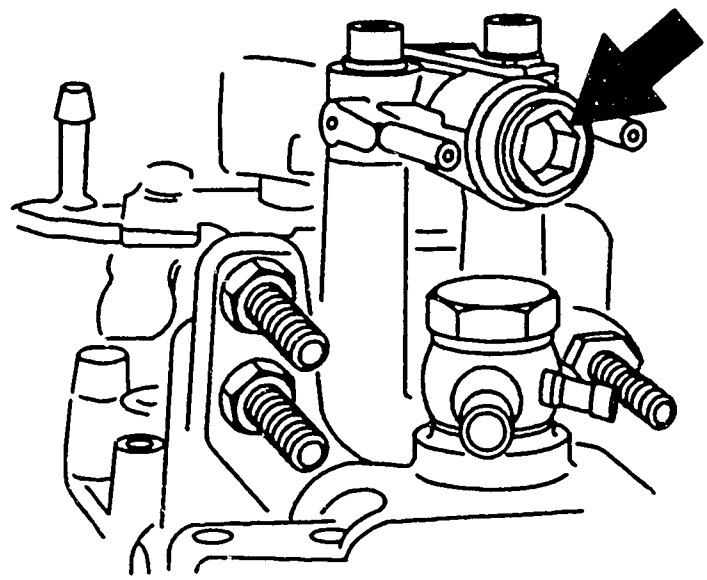
Arrow = Adjusting screw, control valve

Set absolute pressure of 650 hPa by way of control throttle on ALDA tester or Mityvac pump.
Example of vacuum calculation:

Atmospheric pressure	1000 hPa
Absolute pressure	650 hPa
Vacuum required	350 hPa

Adjust control valve if vacuum value is not attained.

Continue: G11/1 Fig.: G10/2



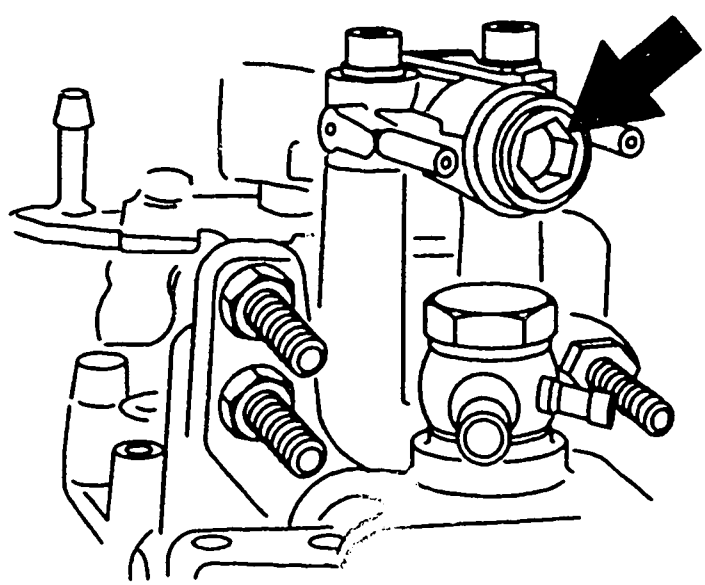
KMK02319

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

Arrow = Adjusting screw, control valve

Adjustment sequence:
With decreasing absolute pressure, adjust setting by turning adjusting screw in counterclockwise direction. Only slight force is to be exerted on the switching valve in this process.
NOTE:
If a new control valve was fitted, atmospheric pressure/min. 800 hPa absolute pressure must be applied with ALDA tester switched on.

Continue: G12/1 Fig.: G11/2



KMK02319

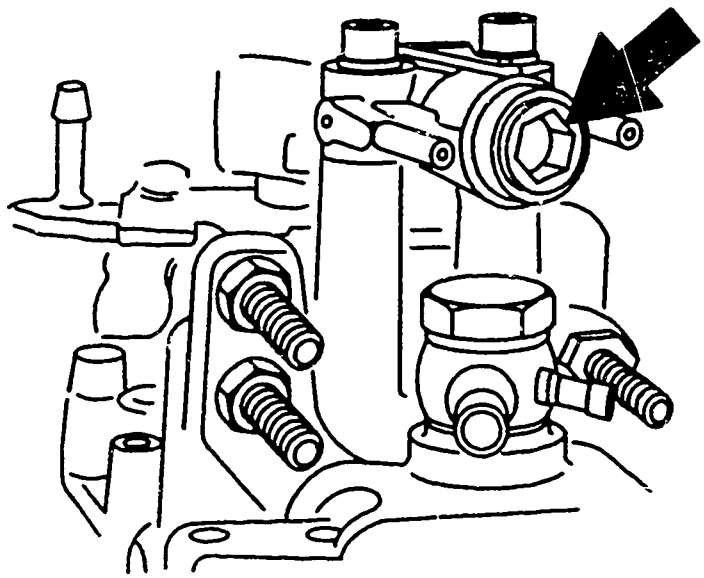
ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

Arrow = Adjusting screw, control valve

If the pressure is below 800 hPa, screw in adjusting screw of control valve until pressure is at least 800 hPa.

Repeat adjustment procedure.

Continue: G13/1 Fig.: G12/2



KMK02319

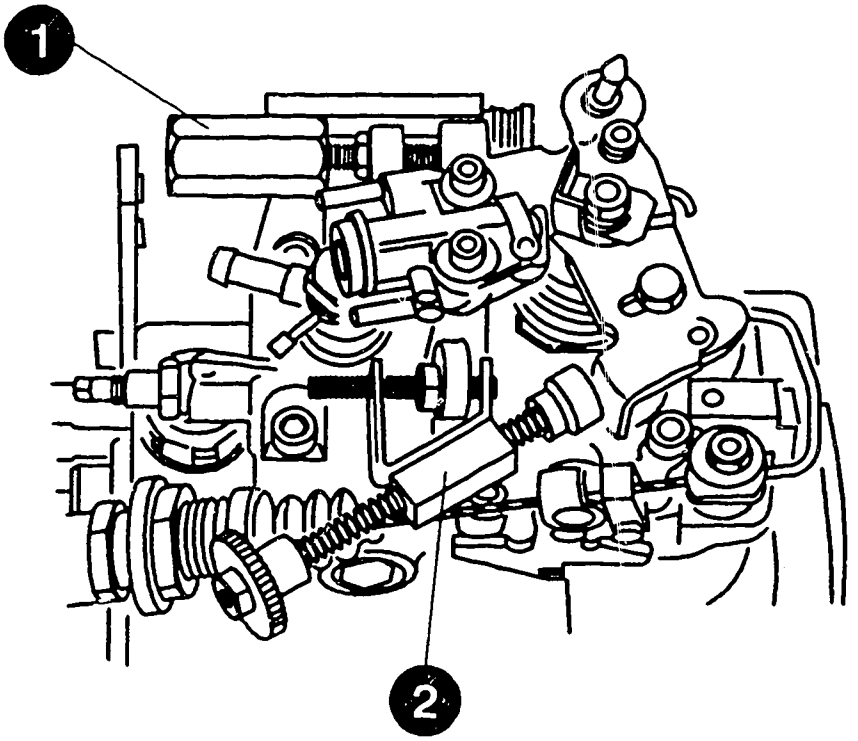
CHECKING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

1 = Spacer
2 = Adjusting screw

Measurement "1"
- With spacing dimension 11.8 mm (provided by spacer)

Insert adjusting screw KDEP 1177.
Set speed-control lever by way of adjusting screw so that it makes slight contact with spacer.

Continue: G14/1 Fig.: G13/2



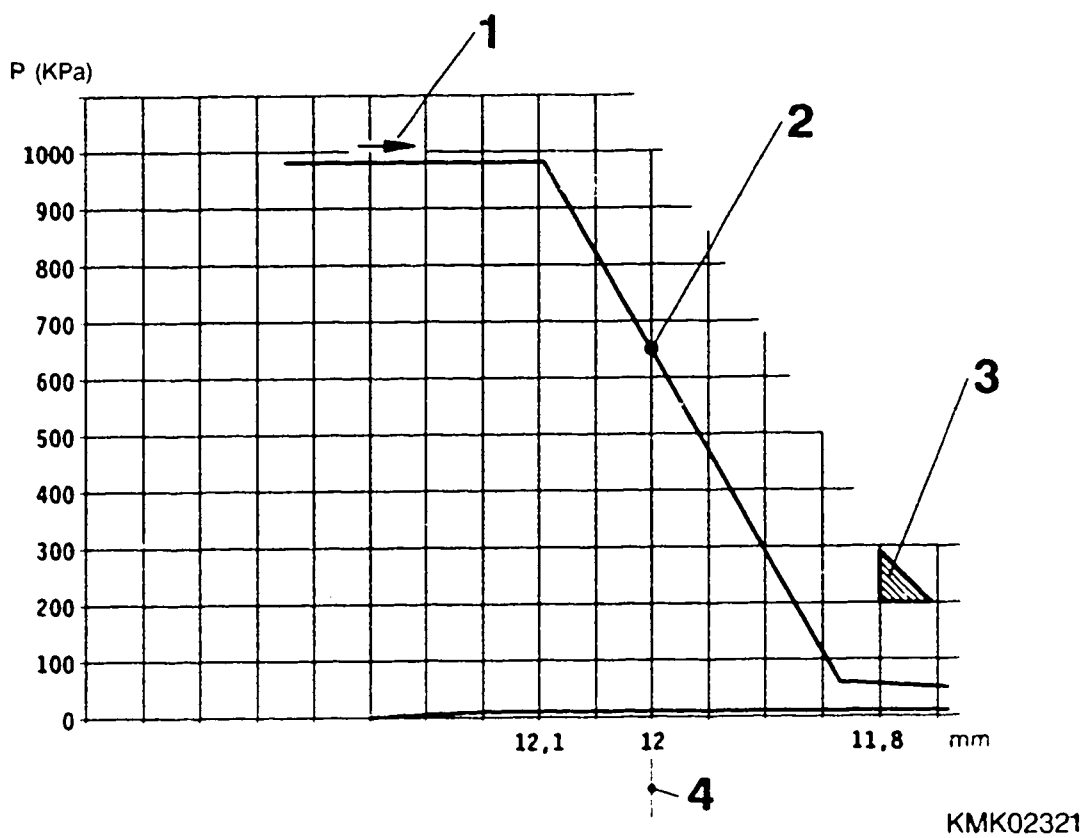
KMK02320

CHECKING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

1 = Adjustment direction
2 = Adjustment point
3 = Lower test point
4 = Spacing dimensions for EGR stop

Position extension spring in drive hub.
Screw in knurled screw as far as stop and tension spring.
Absolute pressure max. 200 hPa
NOTE:
Vacuum build-up when using Mityvac pump approx. 800 hPa

Continue: G15/1 Fig.: G14/2



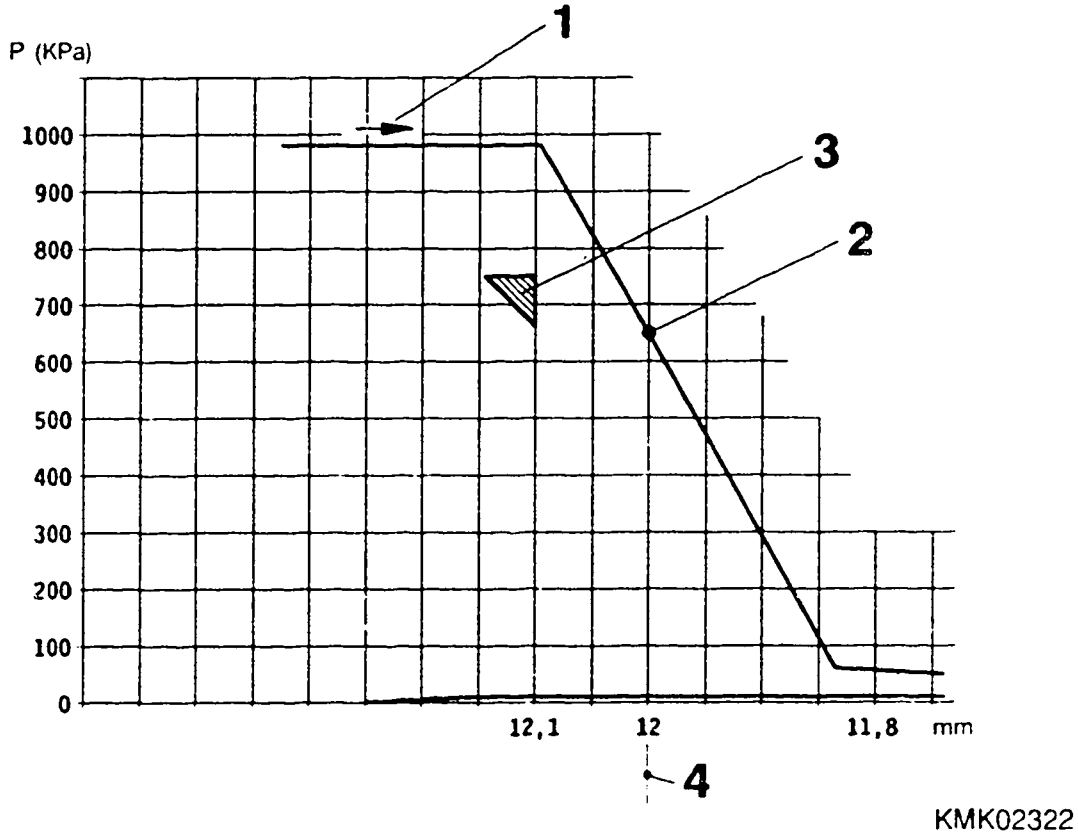
CHECKING SWITCHING POINT (EGR VACUUM CONTROL VALVE)
Measurement "2": Spacing dimension, test-specification sheet

3 = Upper test point

Make up difference with respect to spacing dimension 11.8 mm by way of feeler gauge. Press speed-control lever aginst spacer.
Absolute pressure at least 750 hPa
NOTE:
Vacuum build-up with Mityvac pump
250 hPa
Continue as per Coordinate F12/1

If vacuum values are not attained, check angular position of stop bracket.

Continue: G16/1 Fig.: G15/2



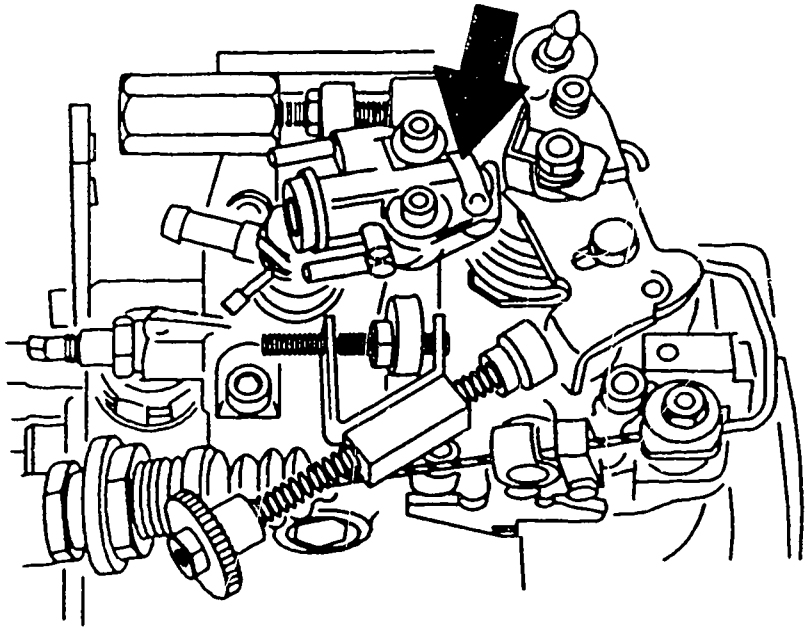
ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

* Checking and adjusting angular position

Arrow = Switching valve

Remove switching valve
Slip adjusting screw KDEP 1177 onto rated-speed adjusting screw.
Slip spacer KDEP 1176 with spacing dimension 11.8 mm onto adjusting screw for part-load quantity.
Make up difference with respect to setting dimension (as per test-specification sheet).
Position speed-control lever by way of knurled screw against spacer piece of spacer.

Continue: G17/1 Fig.: G16/2



KMK02323

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

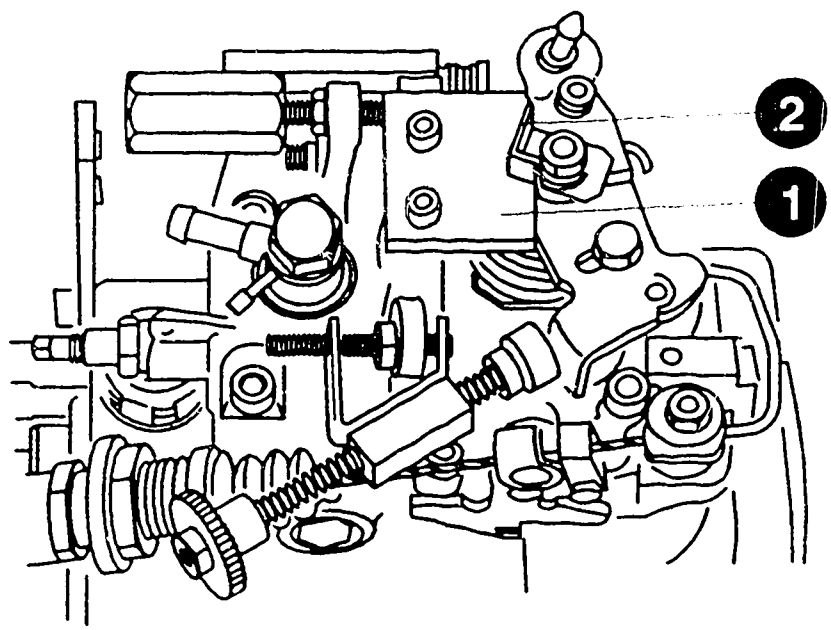
* Checking and adjusting angular position

1 = Adjustment gauge
2 = Stop bracket

Fit adjustment gauge KDEP 1175 instead of switching valve and check angular position of stop bracket.

Adjust stop bracket if adjustment gauge cannot be inserted (turn bracket).

Continue: G18/1 Fig.: G17/2



KMK02324

ADJUSTING SWITCHING POINT (EGR VACUUM CONTROL VALVE)

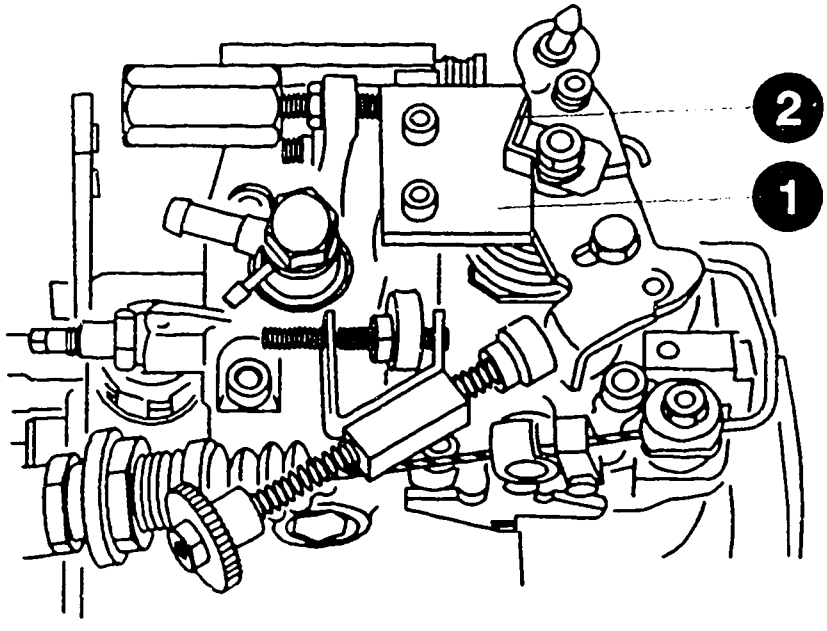
* Checking and adjusting angular position

1 = Adjustment gauge
2 = Stop bracket

Detach hexagon nut from stop bracket and turn stop bracket.

Remove adjustment gauge.
Fit switching valve and repeat switching-point adjustment.

Continue: F12/1 Fig.: G18/2



KMK02324

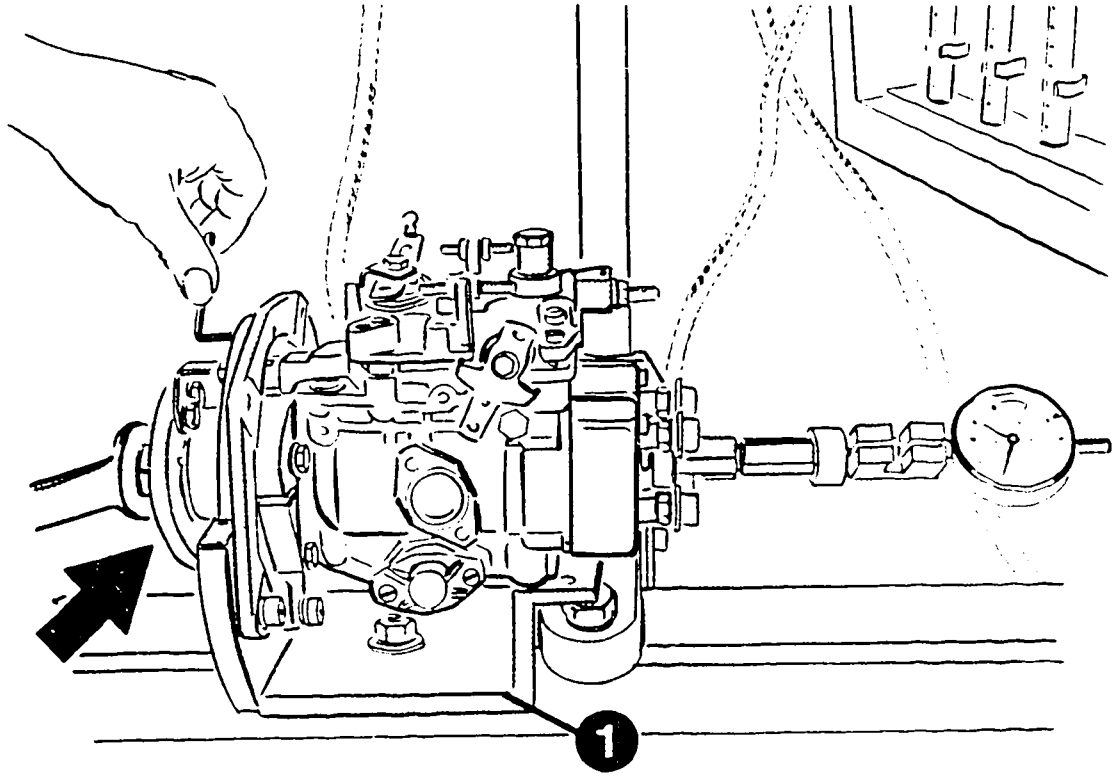
ADJUSTING START OF DELIVERY

* Pointer and marking plate

1 = Clamping bracket

If necessary, remove delivery tubing, calibrating-oil inlet, pressure-gauge connections and test-bench couplings.
Fit clamping bracket 1 688 010 101.
Attach intermediate flange 1 465 700 301.
Install engine coupling half (arrow).

Continue: G20/1 Fig.: G19/2



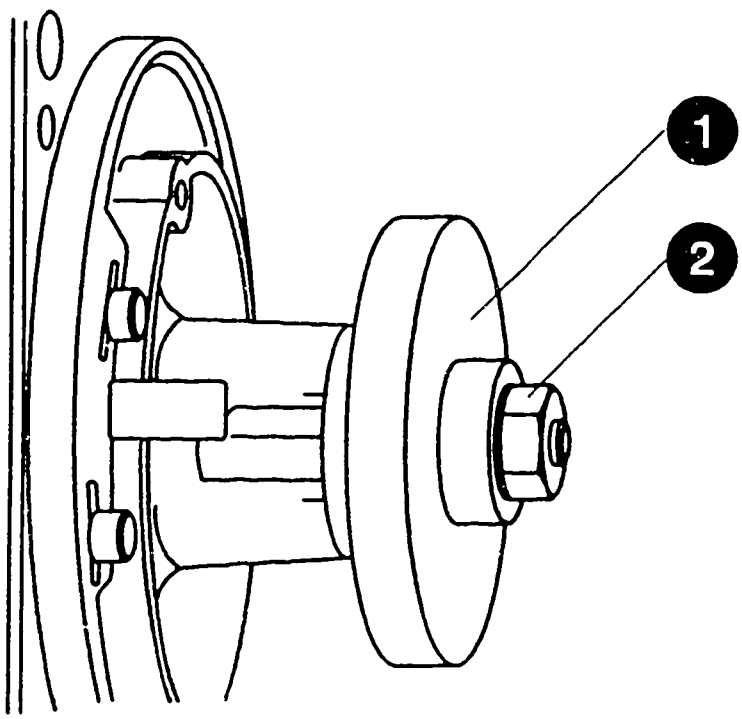
KMK 02325

ADJUSTING START OF DELIVERY

1 = Coupling half
2 = Securing nut

Screw securing nut onto coupling half and tighten to tightening torque 60...70 Nm.
Counterhold coupling half with suitable wrench.

Continue: G21/1 Fig.: G20/2



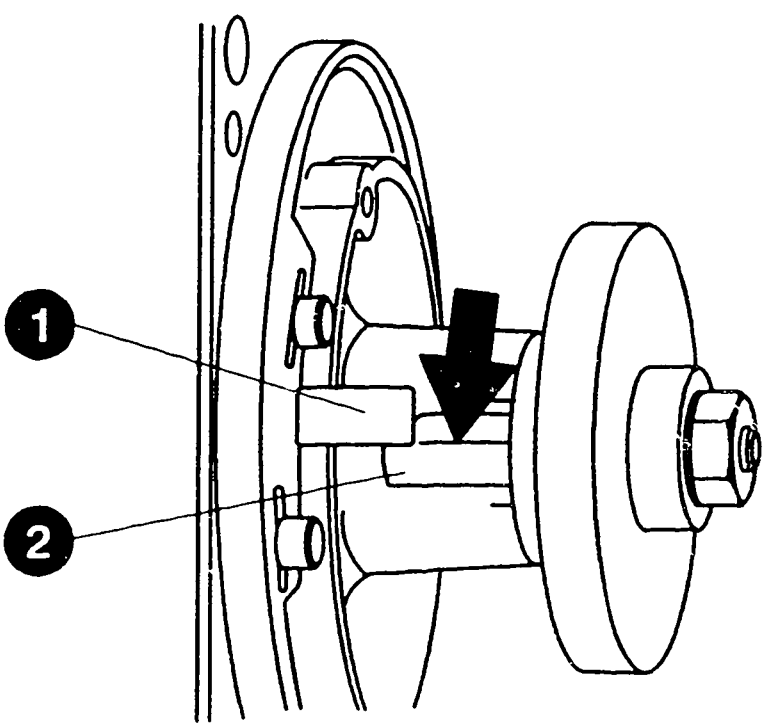
KMK02326

ADJUSTING START OF DELIVERY

1 = Mark, intermediate flange
2 = Mark, coupling half

Attach plunger-stroke measuring device KDEP 1085 and set dial indicator to "zero" in BDC position of distributor pump plunger.
Turn drive shaft in direction of pump rotation until dial indicator shows setting as per test-specification sheet.
Set pointer on intermediate flange in this position such that it points towards "center of notch" (arrow) of mark on coupling half.

Continue: G22/1 Fig.: G21/2



KMK02327

ADJUSTING START OF DELIVERY

Turn back drive shaft and check setting again.

NOTE
Pointers and marking plates of 4-barrel and 6-barrel pumps differ and are thus not interchangeable. The markings are indicated appropriately.

Continue: F12/1

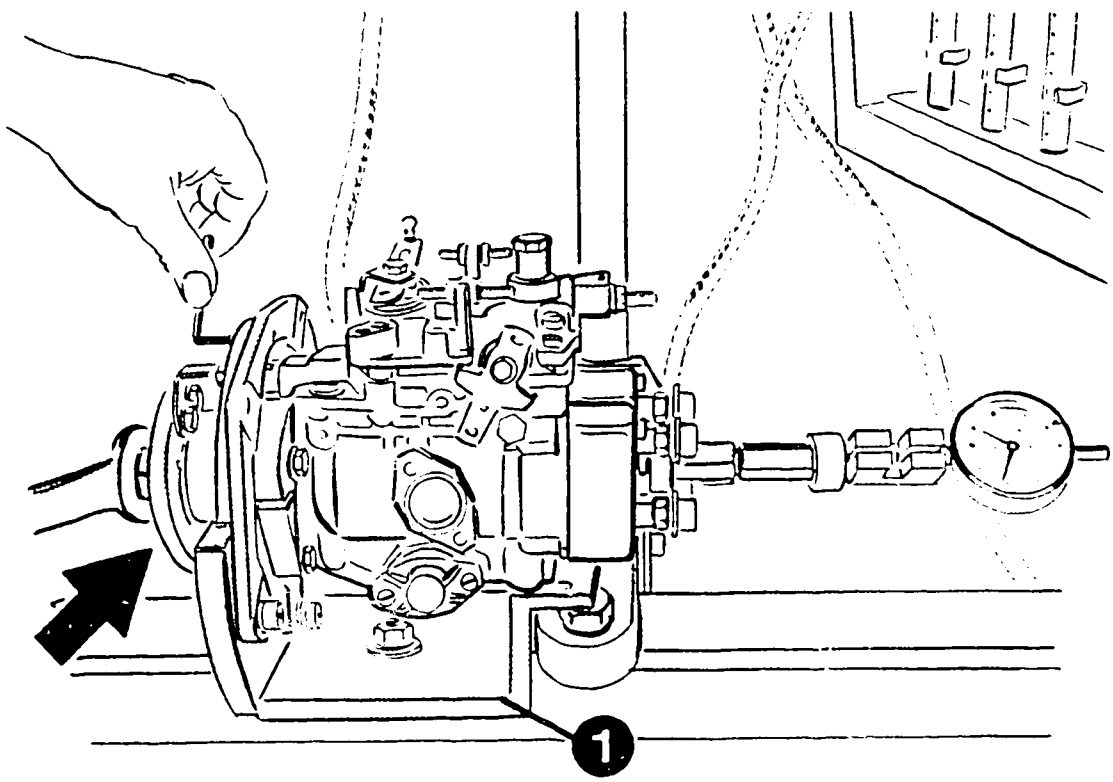
ADJUSTING START OF DELIVERY

* Version with notched plate

1 = Clamping bracket

If necessary, remove delivery tubing,
calibrating-oil inlet line,
pressure-gauge connections and
test-bench coupling.
Clamping bracket 1 688 010 101.
Attach intermediate flange
1 465 700 301.
Install engine coupling half (arrow).

Continue: G24/1 Fig.: G23/2

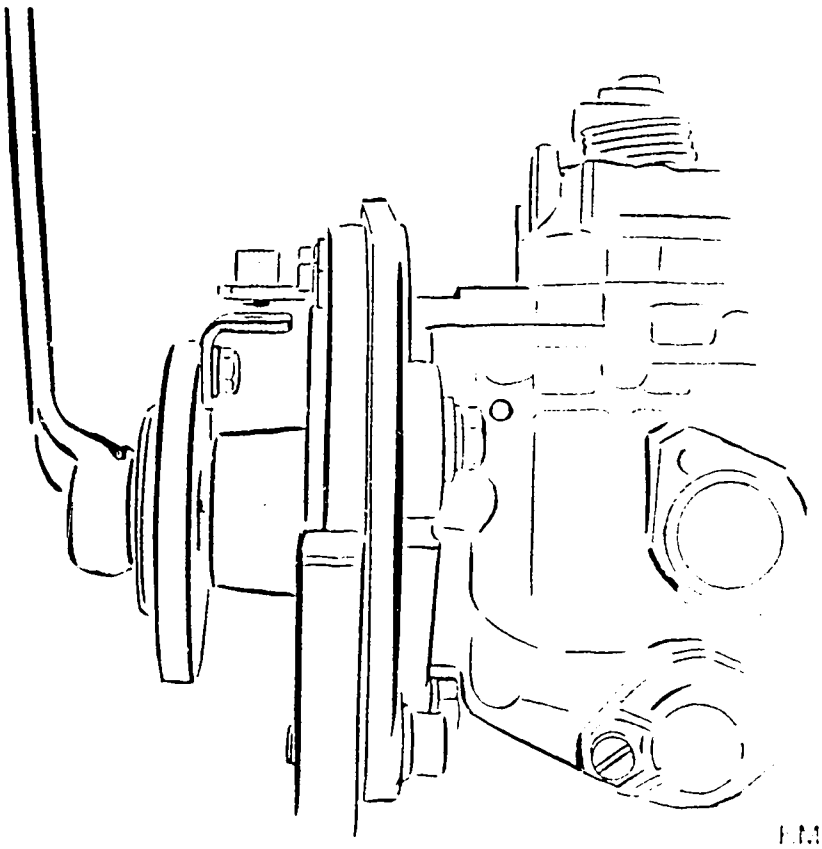


FMK 02325

ADJUSTING START OF DELIVERY

Screw securing nut onto coupling half and tighten to tightening torque 60...70 Nm.
Counterhold coupling half with suitable wrench.

Continue: G25/1 Fig.: G24/2

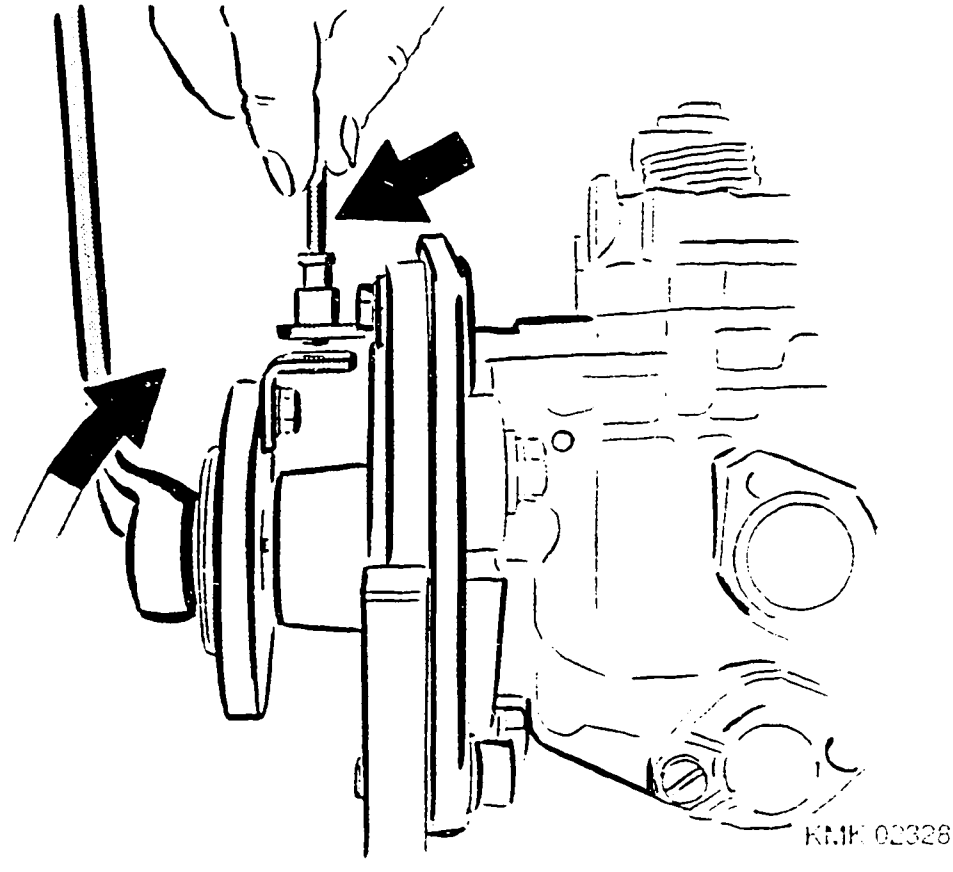


ADJUSTING START OF DELIVERY

1 = Fixing pin

Attach plunger-stroke measuring device KDEP 1085 and adjust dial indicator to "zero" in BDC position of distributor pump plunger.
Turn drive shaft in direction of pump rotation until dial indicator shows setting as per test-specification sheet.
Set upper notched plate in this pump position such that fixing pin KDEP 1108 engages in upper and lower notched plate.

Continue: G26/1 Fig.: G25/2



ADJUSTING START OF DELIVERY

Tighten fastening screws of upper notched plate.

Remove fixing pin.
Turn back drive shaft.
Check setting again.

The lower notched plate is marked in line with the number of engine cylinders.
Remove plunger-stroke measuring device.
Fit bleeder screw with new seal.

Continue: F12/1

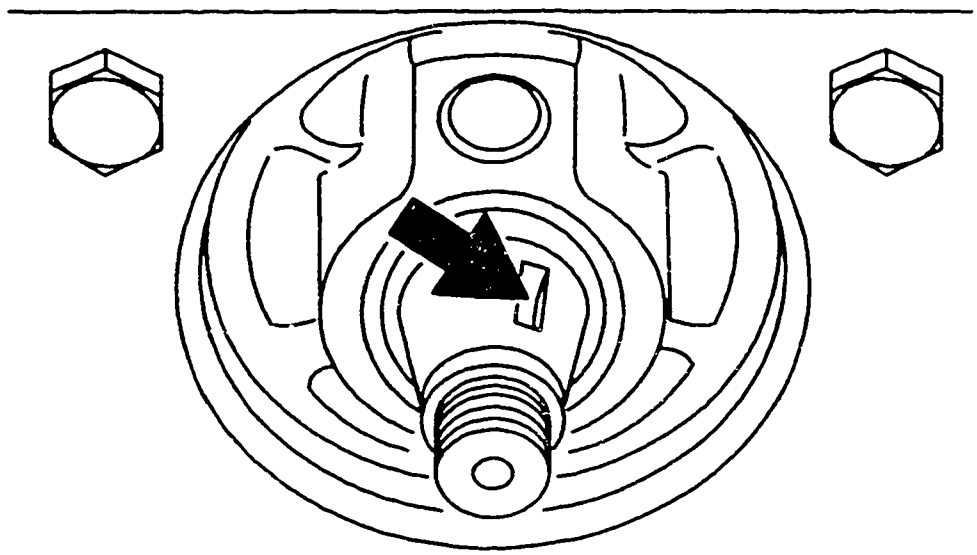
ADJUSTING START OF DELIVERY

Blocking of drive shaft with locking screw
Indication in test-specification sheet "locked timing"

Remove bleeder screw.

Insert Woodruff key in keyway of drive shaft (arrow).

Continue: G28/1 Fig.: G27/2

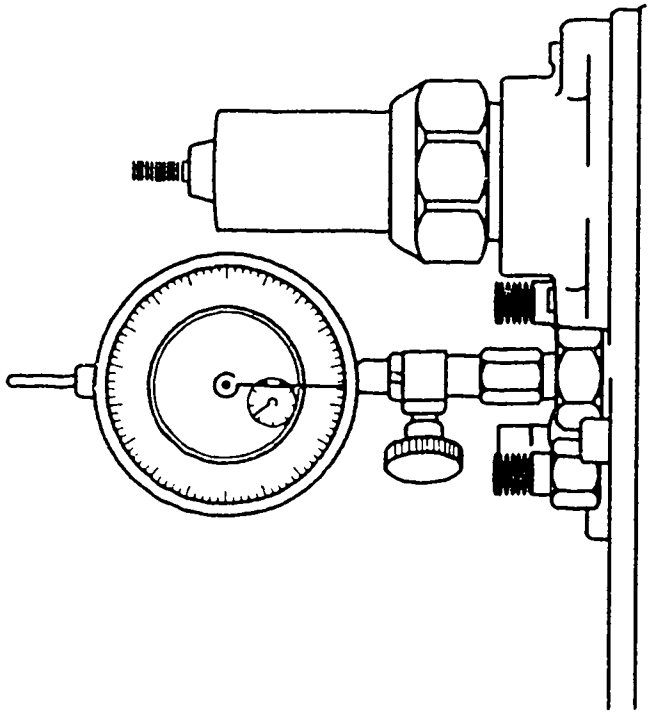


KMK02330

ADJUSTING START OF DELIVERY

Slip drive coupling onto drive shaft. Attach plunger-stroke measuring device KDEP 1085 (see picture) and set dial indicator to "zero" in BDC position of distributor pump plunger.

Continue: H01/1 Fig.: G28/2



KMK02329

ADJUSTING START OF DELIVERY

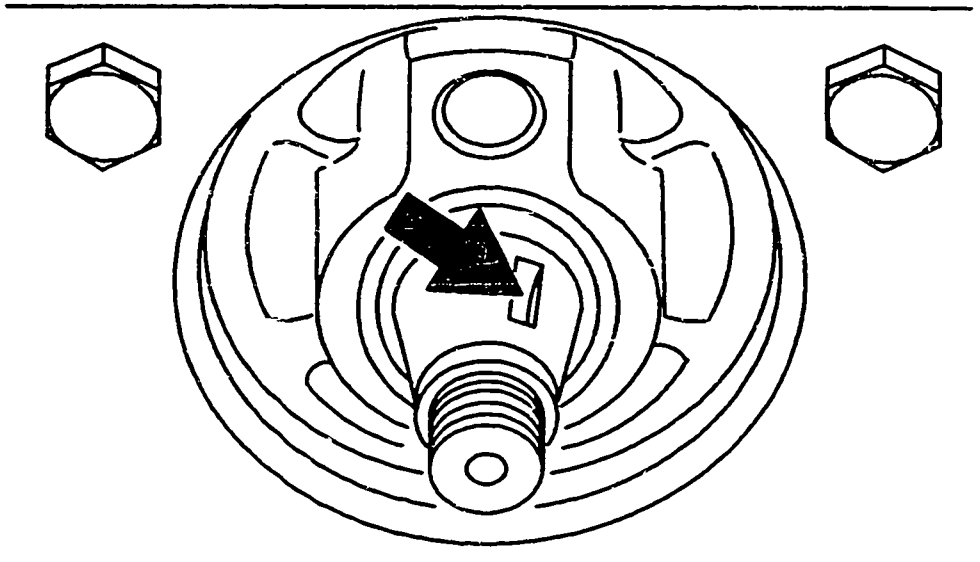
1 = Keyway

Turn pump drive shaft in direction of pump rotation until drive-shaft keyway points to appropriate outlet on distributor head.
Slowly continue turning drive shaft until setting is attained.

Setting for appropriate outlet is given in test-specification sheet under locked timing.

Adjust setting to upper tolerance.

Continue: H02/1 Fig.: H01/2



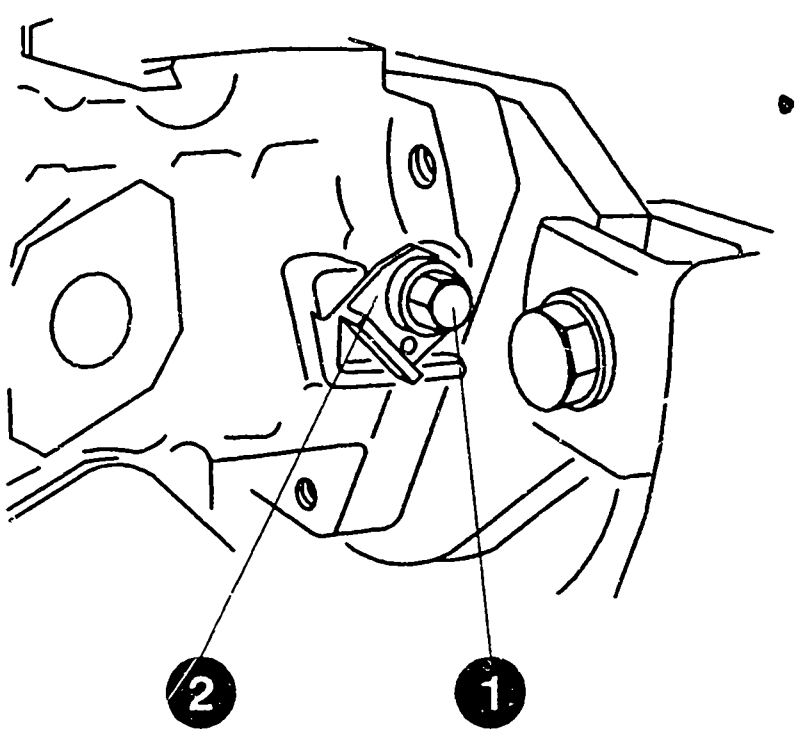
KMK02330

ADJUSTING START OF DELIVERY

1 = Locking screw
2 = Support plate

Repeat adjustment procedure if setting is passed.
Remove support plate of locking screw and attach to control lever with sealing wire.
Screw in locking screw and block drive shaft.
Tightening torque 27...35 Nm.

Continue: H03/1 Fig.: H02/2



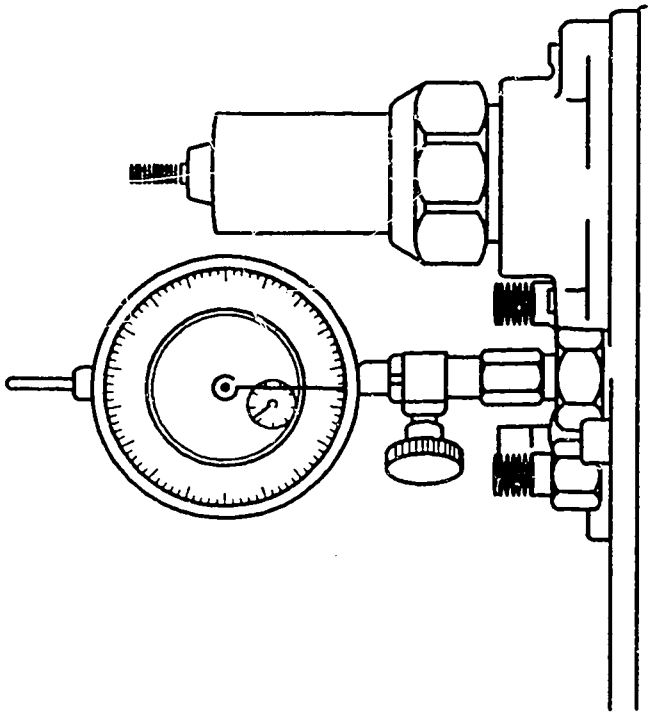
KMK02331

ADJUSTING START OF DELIVERY

Observe setting during blocking of drive shaft.
Repeat adjustment procedure if value deviates.

Remove plunger-stroke measuring device and screw in bleeder screw with new packing disk.

Continue: H04/1 Fig.: H03/2



KMK02329

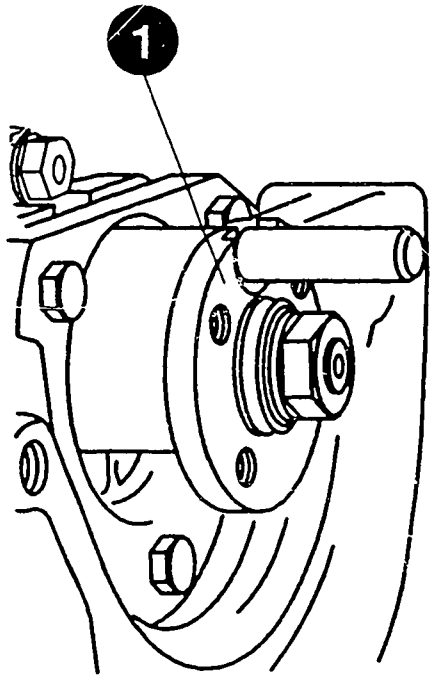
ADJUSTING START OF DELIVERY

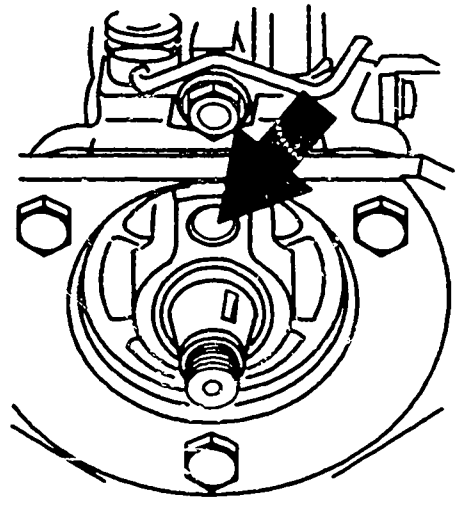
1 = Coupling half

* Fitting coupling half

Remove drive coupling (test bench).
Do not turn drive shaft whilst doing so.
Clean tapered surfaces (grease and dirt-free).
Fit coupling half and turn until setting mandrel KDEP 1173 can be inserted through coupling half into setting hole (arrow).

Continue: H05/1 Fig.: H04/2





KMK02332

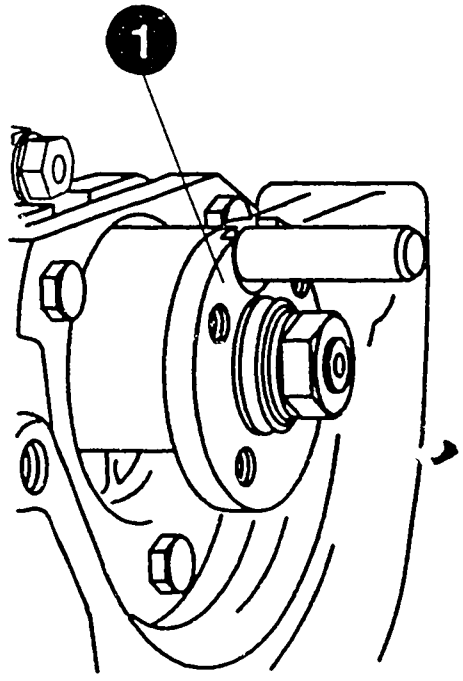
ADJUSTING START OF DELIVERY

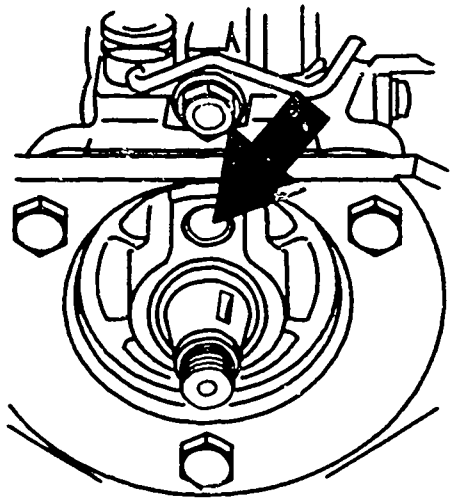
1 = Coupling half

Attach securing nut to coupling half and tighten to pre-tightening torque 30 Nm.

I M P O R T A N T
Do not counterhold coupling half by means of setting mandrel in setting hole (arrow).
Loosen locking screw.

Continue: H06/1 Fig.: H05/2





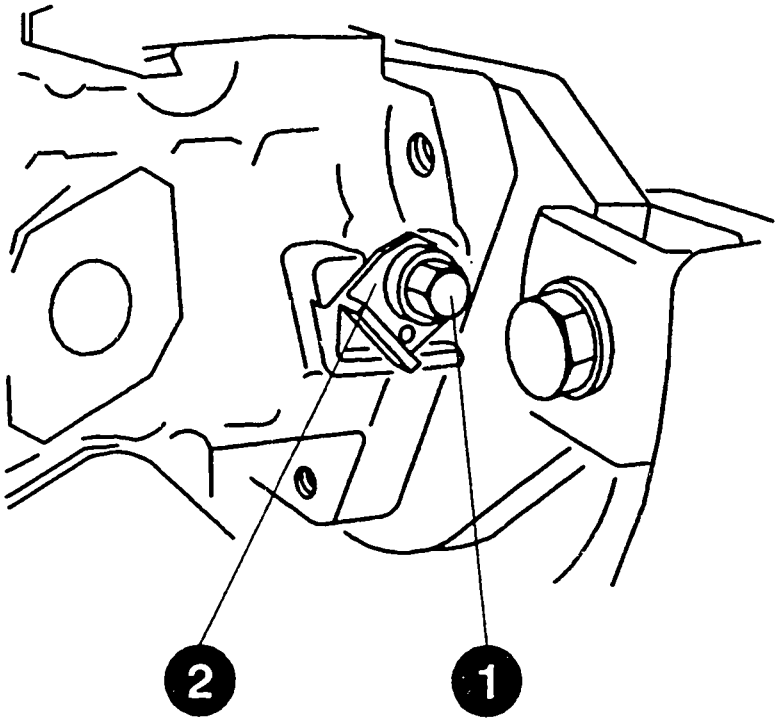
KMK02332

ADJUSTING START OF DELIVERY

1 = Locking screw
2 = Support plate

Loosen locking screw.
Place support plate beneath locking screw and tighten locking screw to 27...35 Nm.

Continue: H07/1 Fig.: H06/2



KMK02331

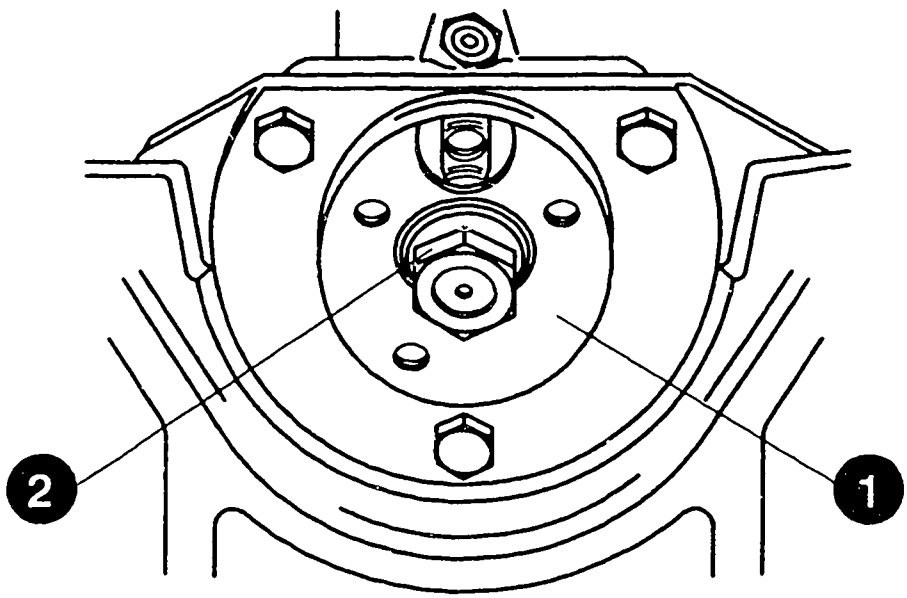
ADJUSTING START OF DELIVERY

1 = Coupling half
2 = Securing nut

Counterhold drive shaft and tighten securing nut (coupling half).

Hexagon nut	90...95 Nm
Flat nut	70...75 Nm

Continue: F12/1 Fig.: H07/2



KMK02333

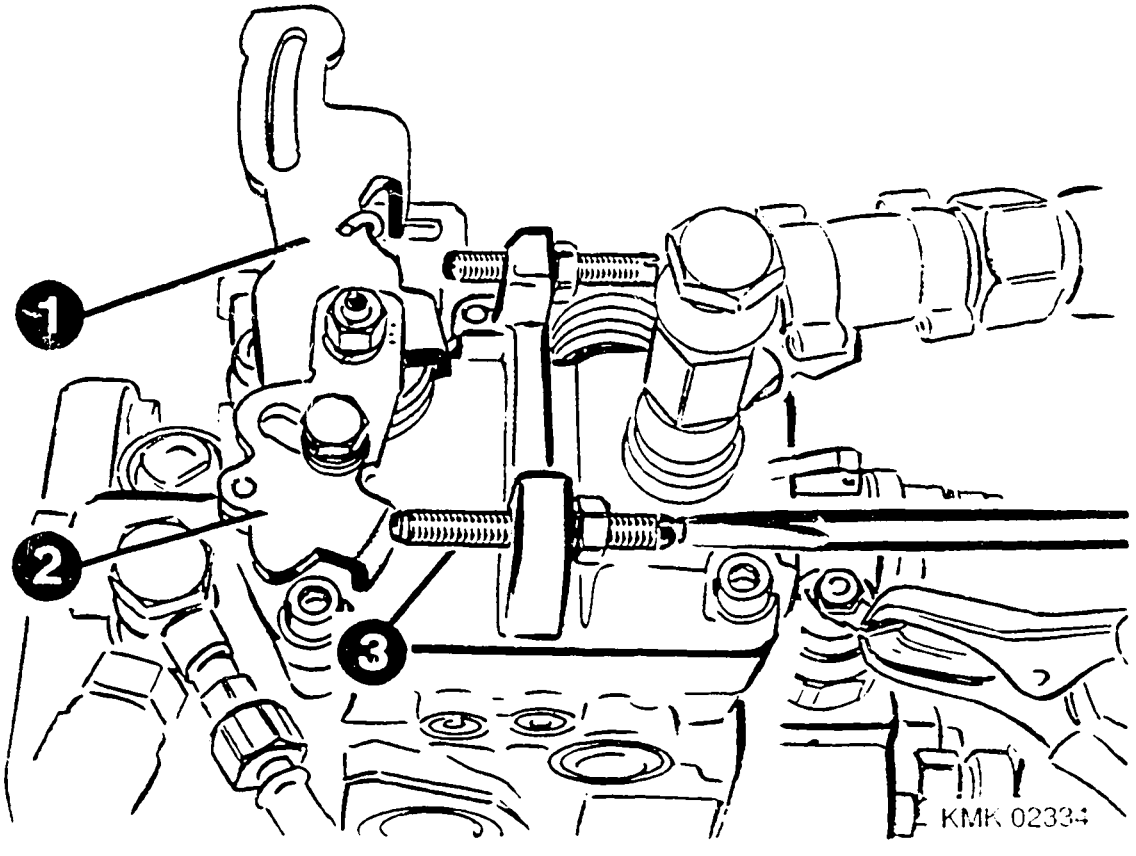
ADJUSTING CONTROL-LEVER POSITION "XK"
* Preadjusting low-idle speed regulation/residual quantity

1 = Long control lever
2 = Short control lever
3 = Adjusting screw

Position both control levers at idle adjusting screw/residual-quantity adjusting screw.

Preset idle quantity with adjusting screw at stated speed.

Continue: H09/1 Fig.: H08/2

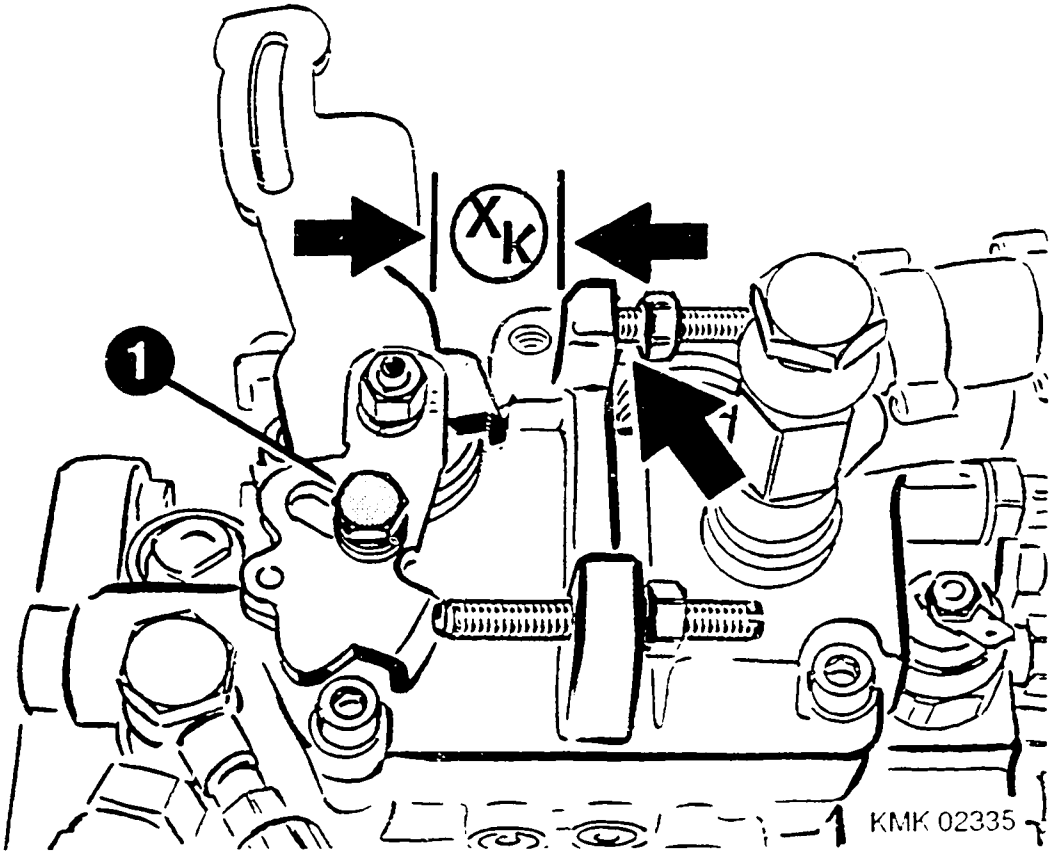


ADJUSTING CONTROL-LEVER POSITION "XK"
 * Preadjusting low-idle speed regulation

1 = Hexagon bolt

Screw out hexagon bolt.
Remove washer for reasons of space for next operation (stamping of control lever) and screw hexagon bolt half way in again with lock washer.
Screw back speed adjusting screw (arrow).
Set control lever to spacing dimension "XK" (refer to test-specification sheet).
Tighten hexagon nut.

Continue: H10/1 Fig.: H09/2

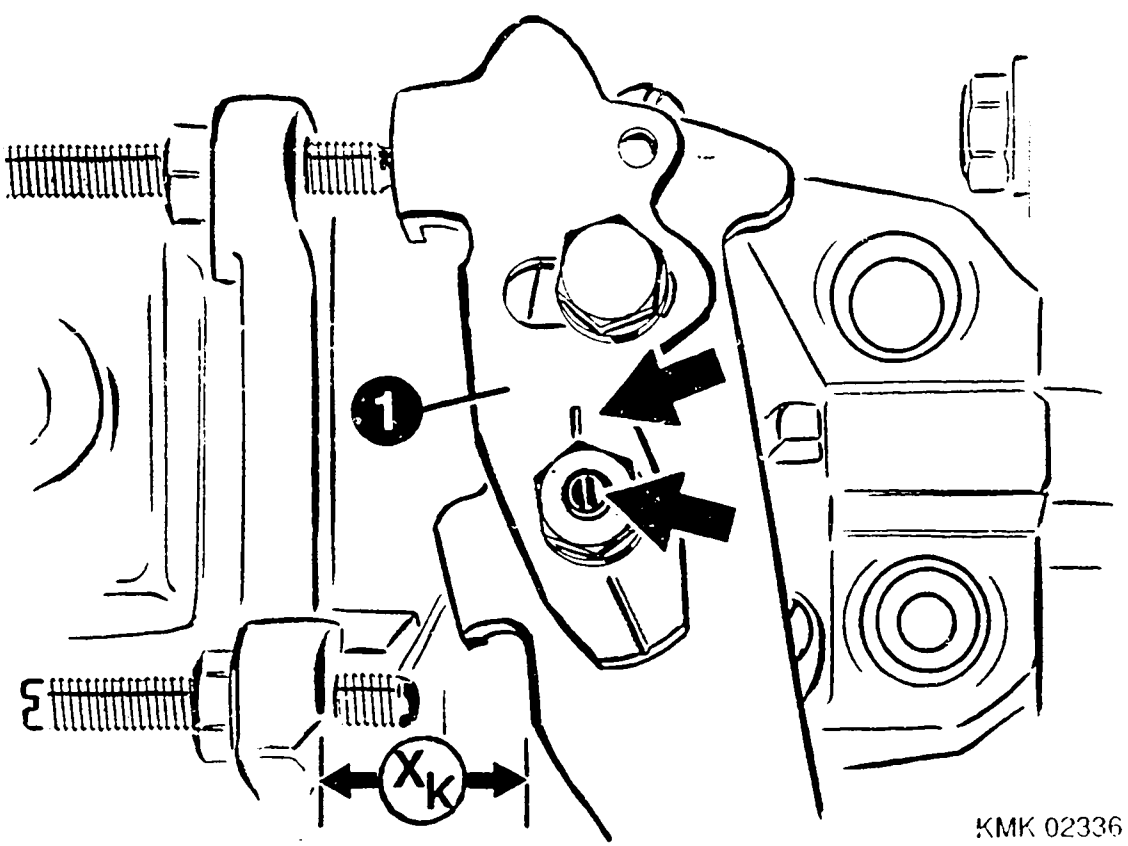


ADJUSTING CONTROL-LEVER POSITION "XK"
* Preadjusting low-idle speed regulation

1 = Short control lever

If both control levers are already stamped, the short control lever must be replaced with a new lever if the dimension "XK" is not attained.
Before removing control lever, mark mutual positions of setting shaft and control lever (arrows).

Continue: H11/1 Fig.: H10/2

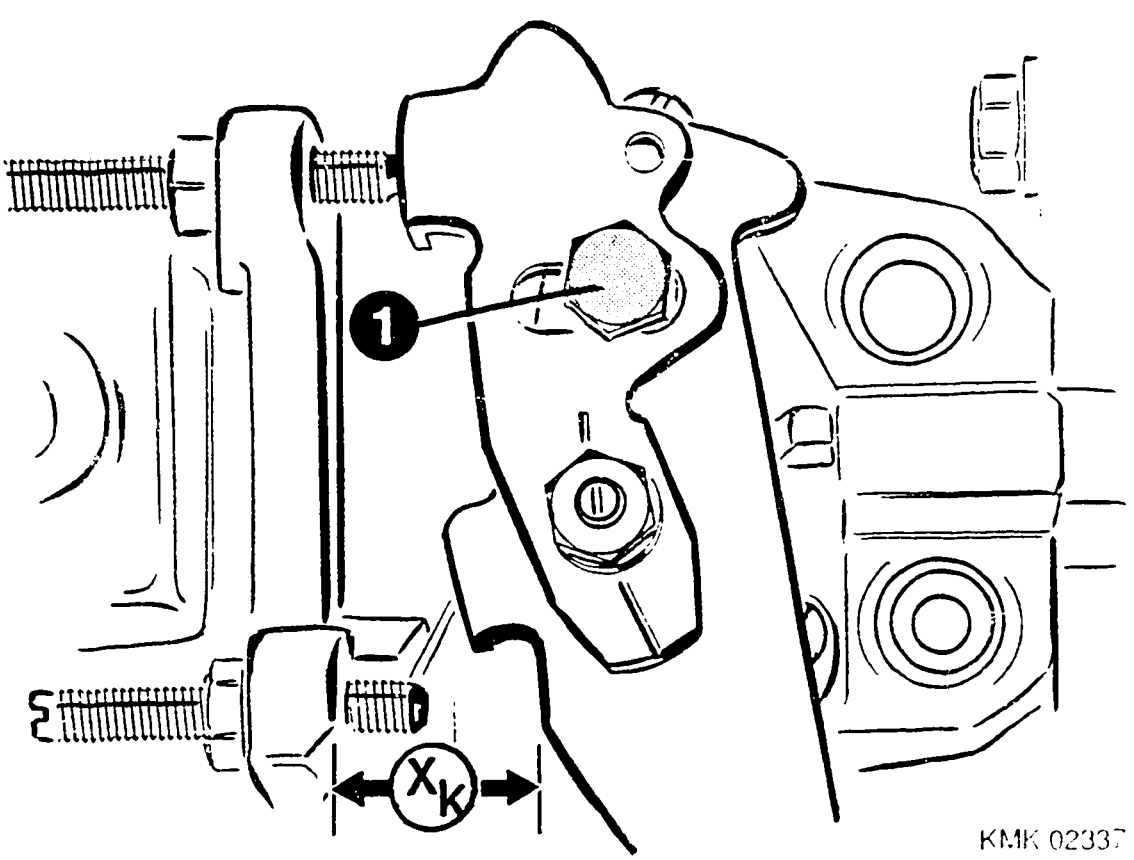


ADJUSTING CONTROL--LEVER POSITION "XK"
 * Preadjusting low-idle speed
   regulation

1 = Hexagon bolt

Adjust dimension "XK" after fitting
new control lever.
Do not install washer.
Tighten hexagon nut.

Continue: H12/1 Fig.: H11/2

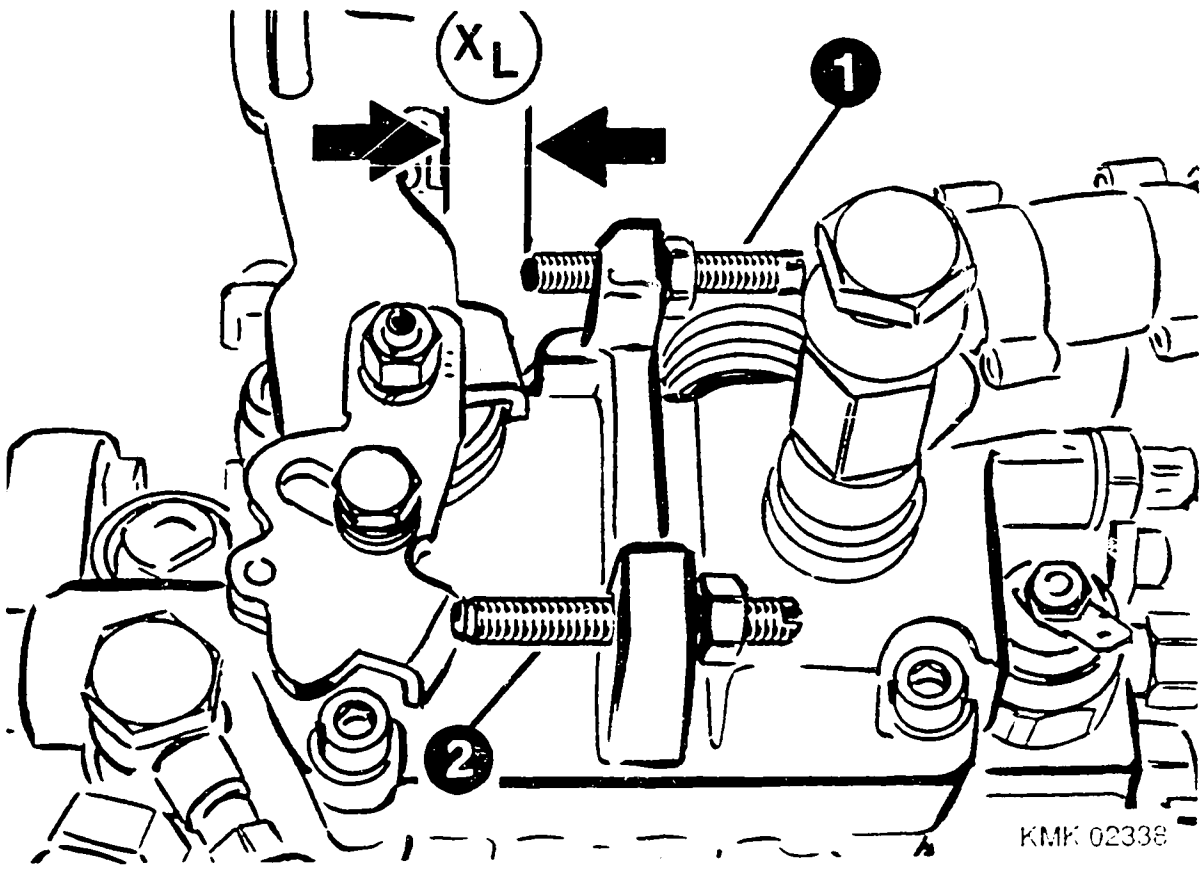


SETTING CONTROL-LEVER POSITION "XL"
 * Preadjusting full-load speed regulation

1 = Rated-speed adjusting screw
2 = Idle adjusting screw

Position long control lever at rated-speed adjusting screw.
Measure delivery at stated speed.
Effect correction at rated-speed adjusting screw.
Position short control lever at idle adjusting screw and measure dimension "XL".

Continue: H13/1 Fig.: H12/2

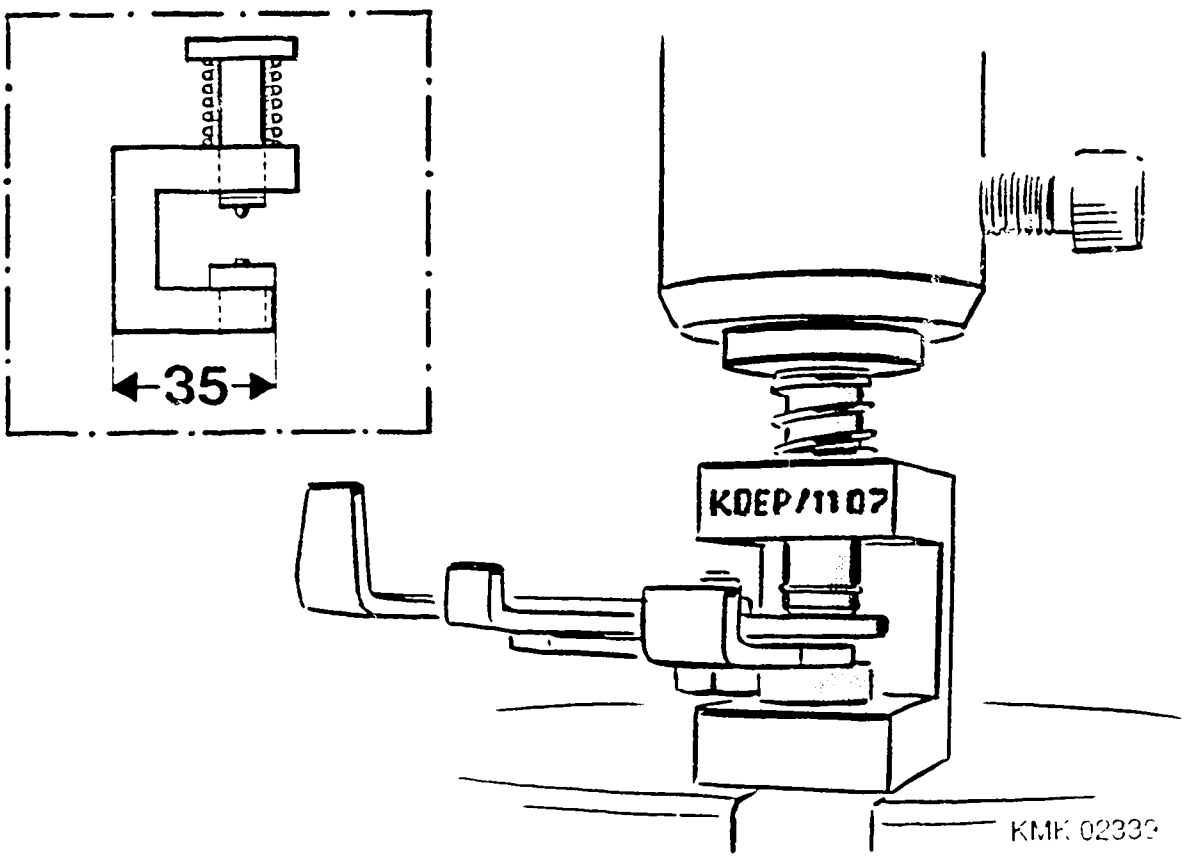


STAMPING CONTROL LEVERS

Unscrew securing nut of setting shaft.
Remove spring washer.
Detach control lever from setting shaft.
No longer alter position of control lever.

Stamp both control levers with stamping tool KDEP 1107.
Stamping tool is to be modified as shown in the case of control levers with soldered-in threaded pins.

Continue: H14/1 Fig.: H13/2

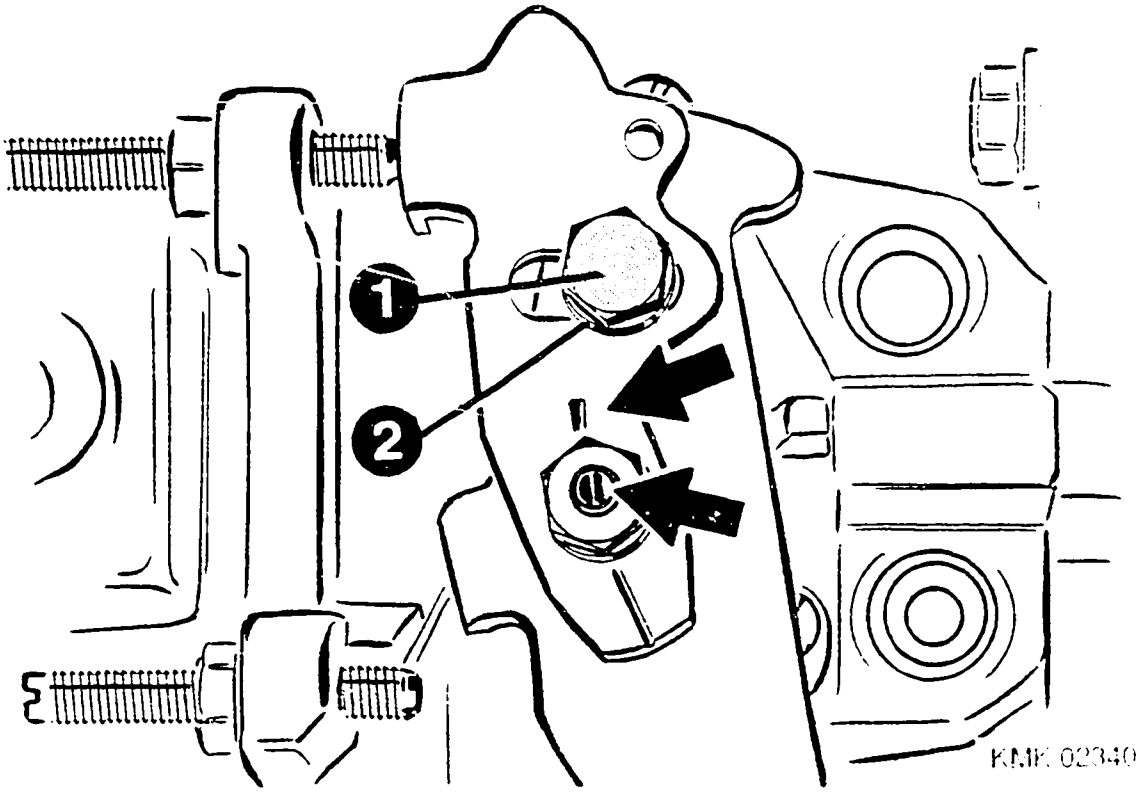


1 = Hexagon nut
2 = Spring washer

Attach control lever to setting shaft such that marks on control lever and setting shaft coincide (arrows).

Fit spring washer and hexagon nut and tighten to 6...9 Nm.

Continue: H15/1 Fig.: H14/2

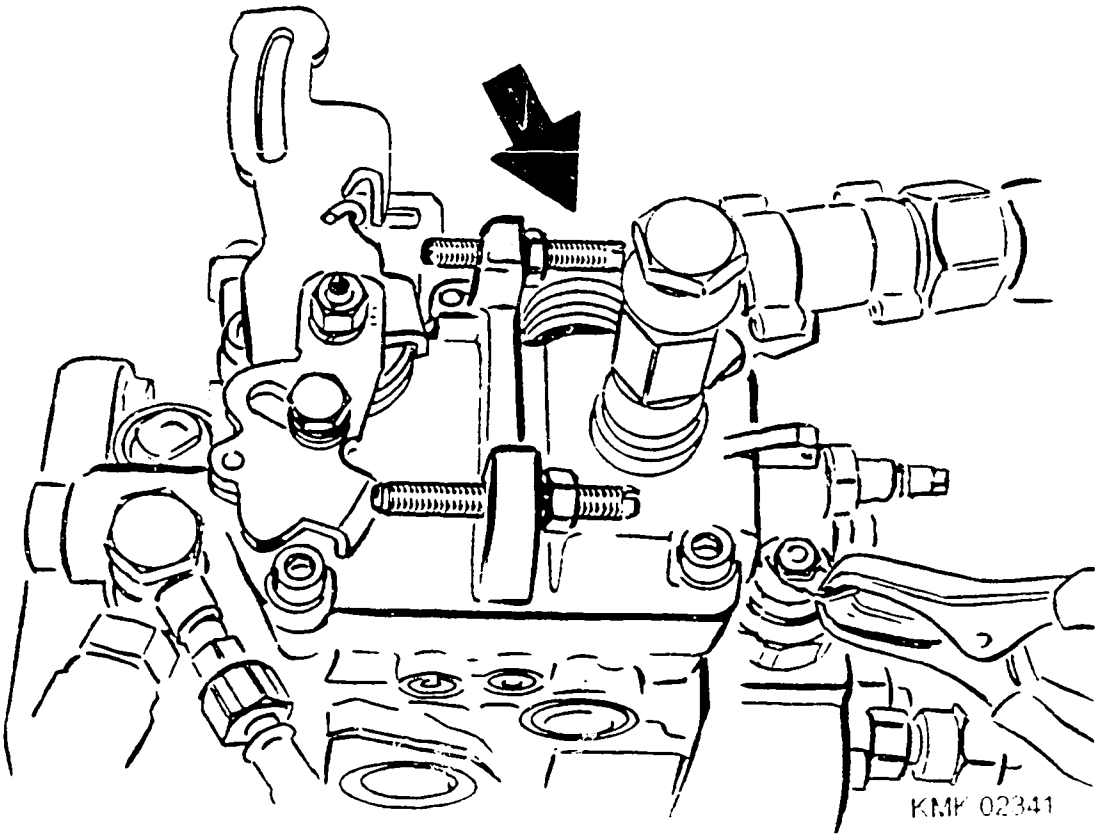


CHECKING FULL-LOAD DELIVERY

Arrow = Rated-speed adjusting screw

Unscrew hexagon bolt at control lever and fit washer.
Screw in rated-speed adjusting screw; check/adjust full-load delivery.

Continue: C28/1 Fig.: H15/2



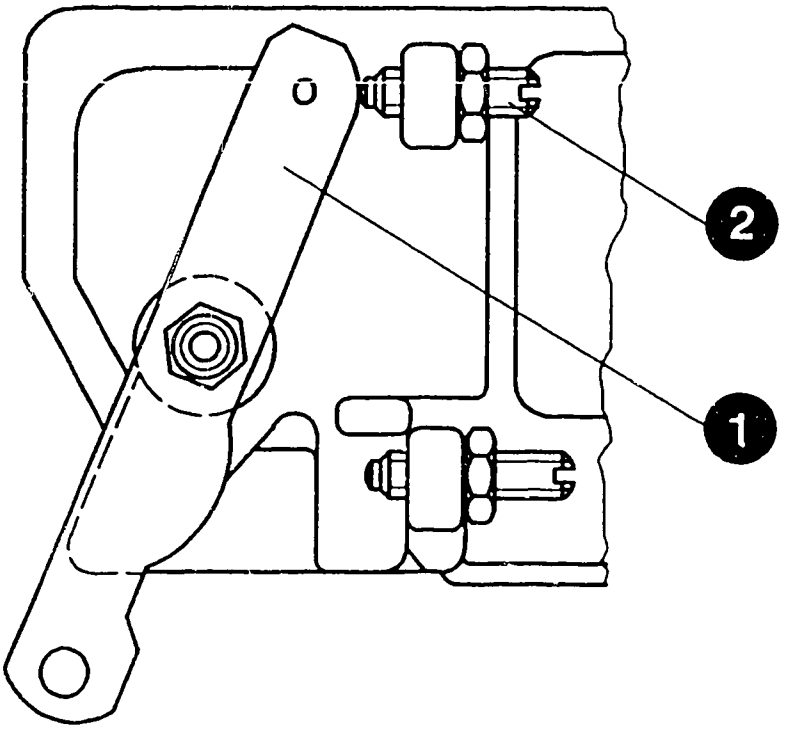
ADJUSTING CONTROL-LEVER POSITION "A"
* Pump with 1-piece control lever

1 = Control lever
2 = Idle adjusting screw

* Adjusting low-idle speed regulation

Position control lever at idle adjusting screw.
Adjust delivery as prescribed with idle adjusting screw at stated speed.

Continue: H17/1 Fig.: H16/2



KMK02342

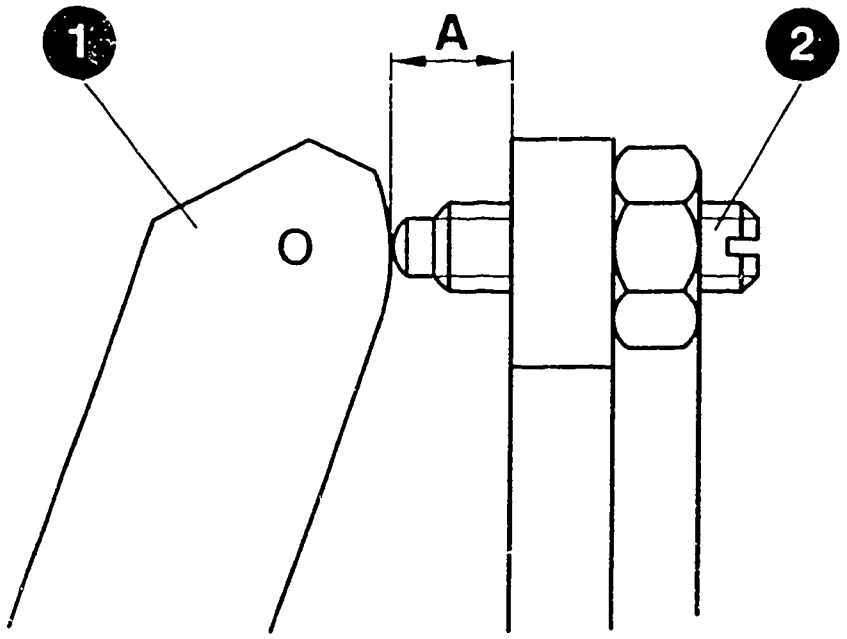
ADJUSTING CONTROL-LEVER POSITION "A"
 * Pump with 1-piece control lever

1 = Control lever
2 = Idle adjusting screw

 * Adjusting low-idle speed regulation

Measure dimension "A" of idle adjusting screw and compare to test-specification sheet.
If the permitted dimension is not attained, move control lever around on setting-shaft toothing.

Continue: H18/1 Fig.: H17/2



KMK02343

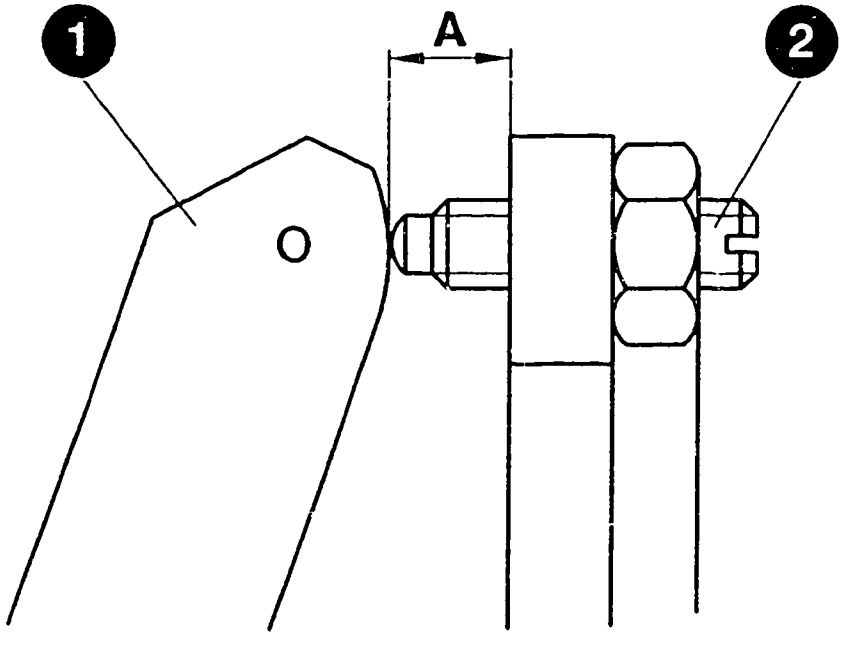
ADJUSTING CONTROL-LEVER POSITION "A"
 * Pump with 1-piece control lever

* Adjusting low-idle speed regulation

Fit securing nut at control lever.
Tightening torque 5...10 Nm

Control levers marked with "0" are offset by half a tooth with respect to control levers with no "0".

Continue: H19/1 Fig.: H18/2



KMK02343

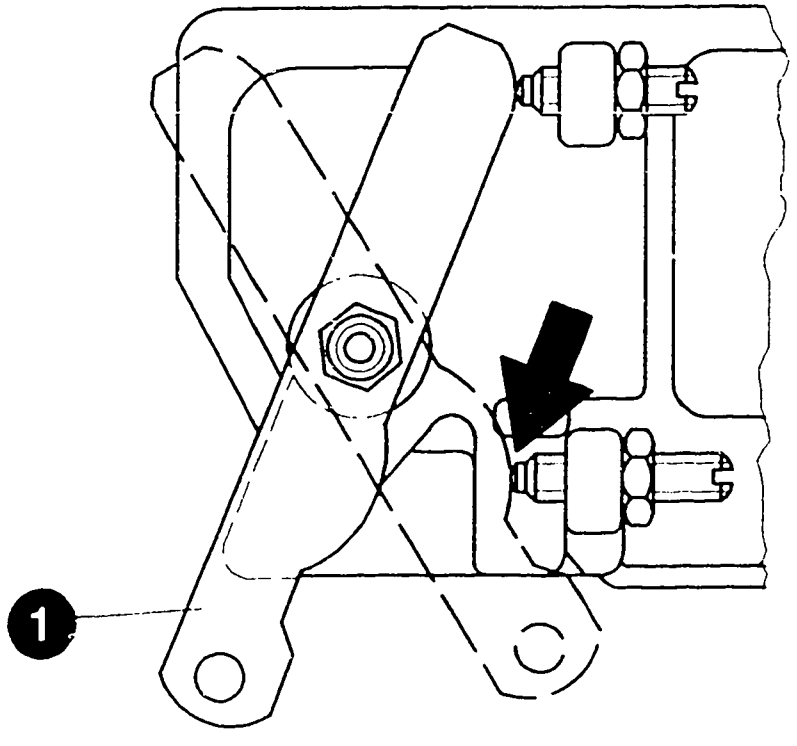
ADJUSTING CONTROL-LEVER POSITION "B"
 * Pump with 1-piece control lever

1 = Control lever

 * Adjusting full-load speed regulation

Position control lever at rated-speed adjusting screw (arrow).
Turn in adjusting screw until delivery is attained at stated speed.

Continue: H20/1 Fig.: H19/2



KMK02344

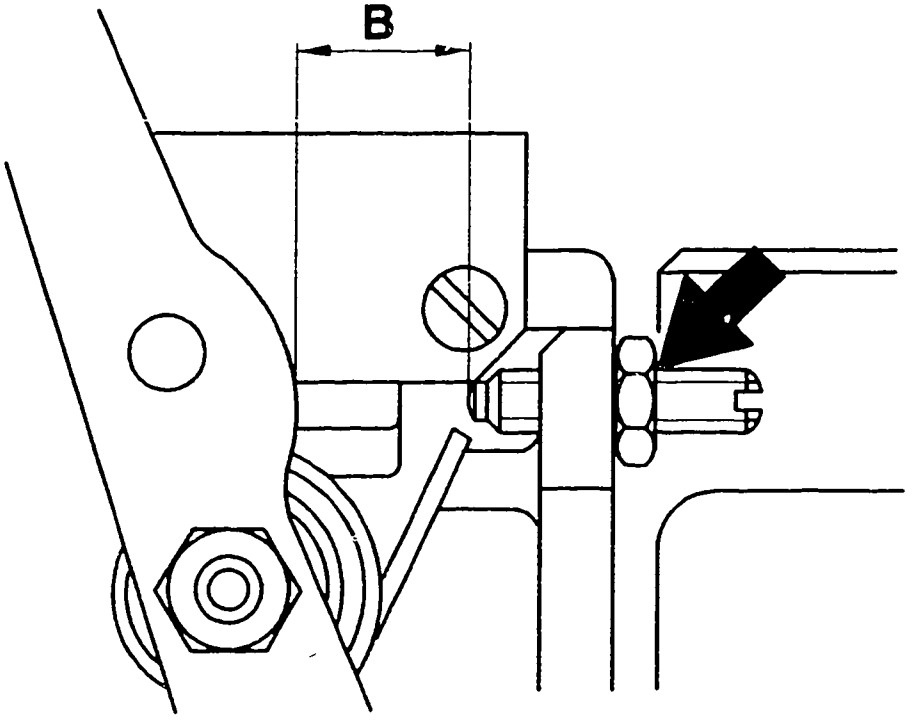
ADJUSTING CONTROL-LEVER POSITION "B"
* Pump with 1-piece control lever

Arrow = Rated-speed adjusting screw

* Adjusting full-load speed regulation

Position control lever at idle
adjusting screw.
Measure dimension "B" - adjustment
travel between idle and rated-speed
adjusting screw - and compare to
value in test-specification sheet.
An incorrect governor spring may have
been installed if measured value is
not attained.

Continue: D07/1 Fig.: H20/2



KMK02345

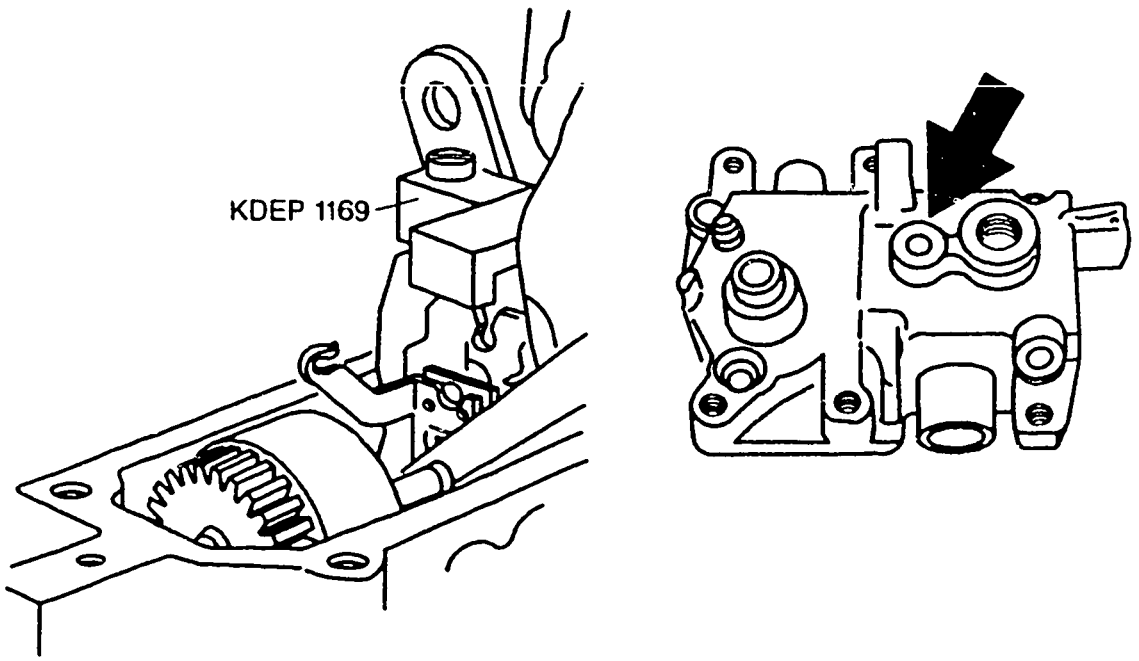
CALIBRATING SLEEVE-STARTING TRAVEL

* Fulcrum-lever stop in distributor-pump housing H22/1

* Fulcrum-lever stop in housing cover

Can be seen from indentation in housing cover (arrow).
Use KDEP 1169 for adjustment of MS dimension.
There is no change in the adjustment procedure as described below.

Continue: H22/1 Fig.: H21/2

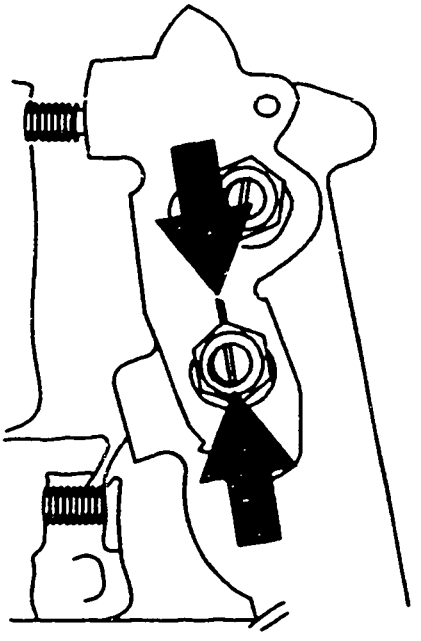


KMK02346

CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL

Mark control lever and shaft with respect to oneanother (arrows).
Remove control lever and cylindrical helical coil spring.
Remove cover fastening screws.
If the rated-speed adjusting screw has to be removed, measure and note down screw-in depth beforehand.
Raise cover and press through shaft in direction of inside of cover.

Continue: H23/1 Fig.: H22/2



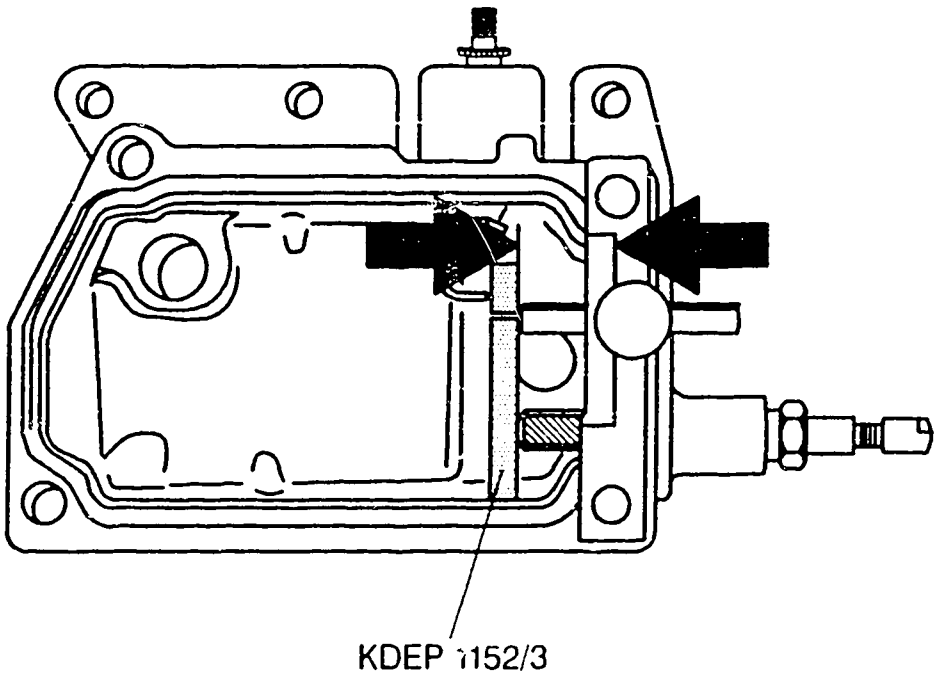
KMK02289

CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL

Remove variable-speed governor/part load governor.

Do not alter full-load adjusting screw. If position of full-load screw has to be altered, determine screw-in depth of full-load screw with KDEP 1152/3.
Procedure: Position measuring arm at full-load screw.
Measure screw-in depth of full-load screw with caliper gauge (picture).

Continue: H24/1 Fig.: H23/2



KMK02361

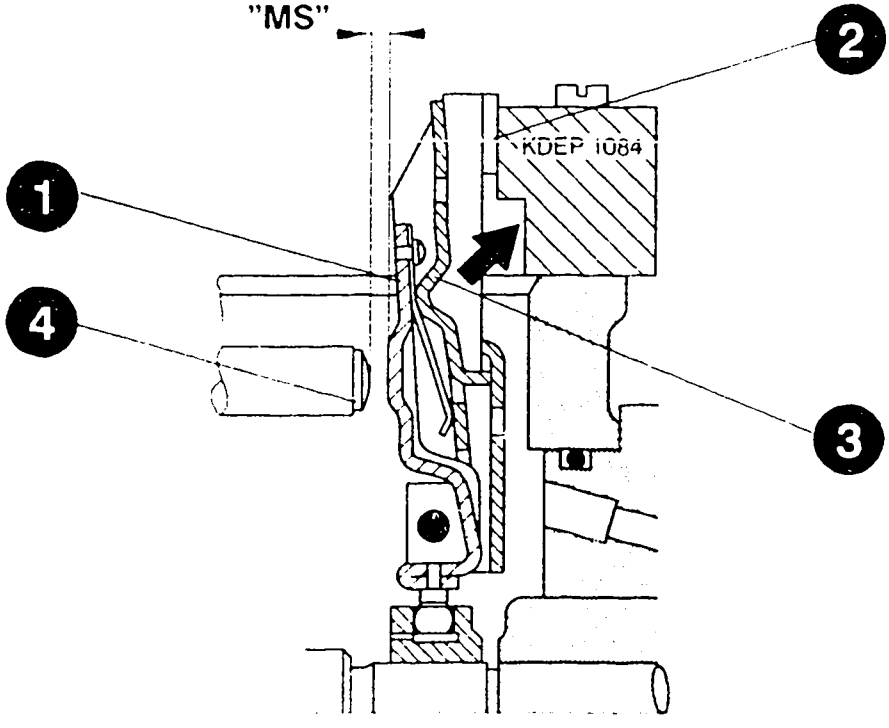
CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL

1 = Starting lever
2 = Correction lever
3 = Tensioning lever
4 = Plug

Attach spacer KDEP 1084 to pump housing with filister-head screws paying attention to recess.

Correction lever in contact with spacer.
Press tensioning lever against stop pin (pump).

Continue: H25/1 Fig.: H24/2



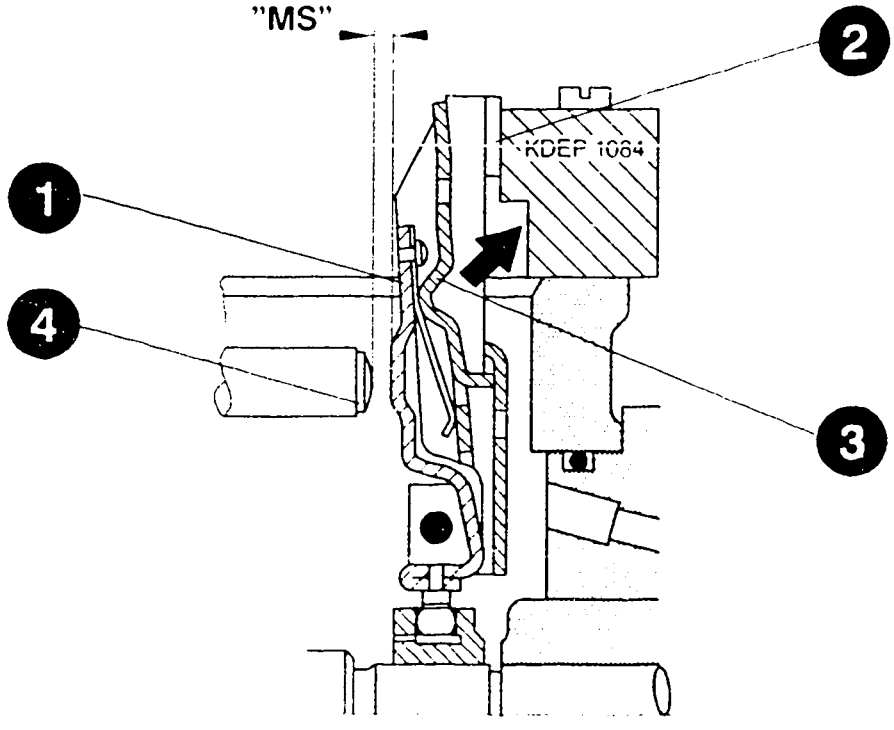
KMK02348

CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL

1 = Starting lever
2 = Correction lever
3 = Tensioning lever
4 = Plug

The dimension "MS" is the dimension betweem the plug and the starting lever in contact with the tensioning lever.
Measure dimension "MS" with feeler gauge and compare to dimension specified in test-specification sheet.
Compensate for difference in dimension by using appropriate plug.
To do so, remove complete governor assembly and sliding sleeve.

Continue: H26/1 Fig.: H25/2

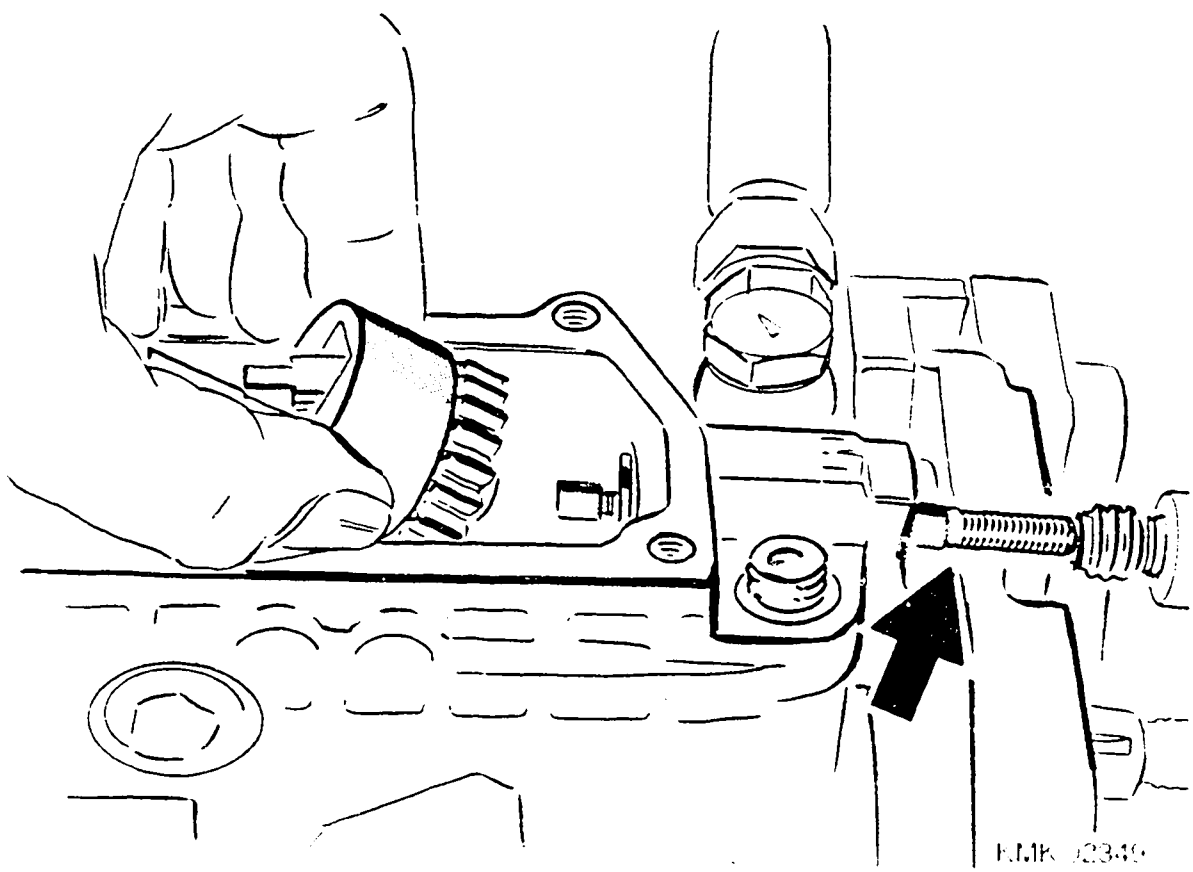


KMK02348

CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL

Loosen slotted hexagon nut at governor shaft and turn out governor shaft. Pull out governor shaft until end of thread coincides with outer edge of pump flange (arrow).

Continue: H27/1 Fig.: H26/2

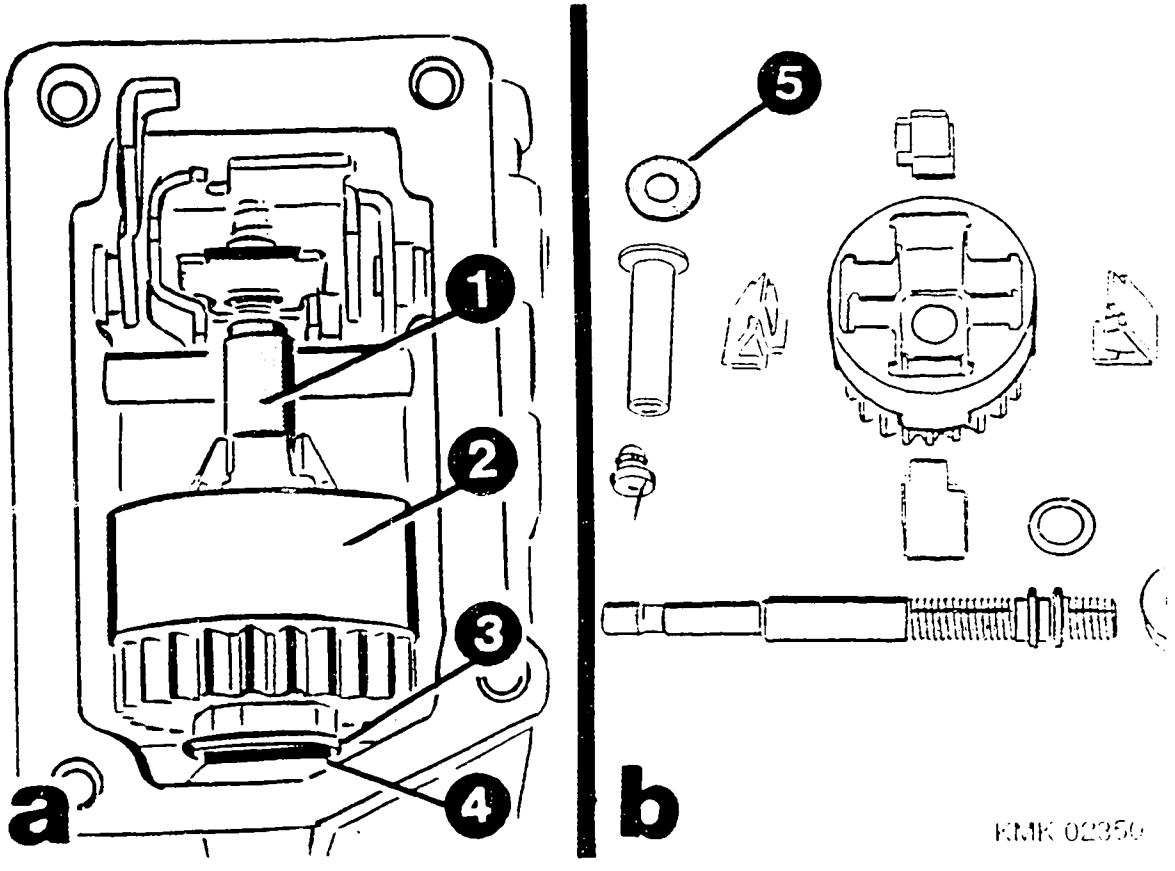


CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL

1 = Sliding sleeve
2 = Governor assembly
3 = Supporting plate
4 = Shims
5 = Spacer

Hold governor assembly with flyweights and sliding sleeve and pull upwards at an angle out of housing.
Remove supporting plate and shim.
When disassembling governor assembly, pay particular attention to spacer beneath sliding sleeve (do not loose).

Continue: H28/1 Fig.: H27/2

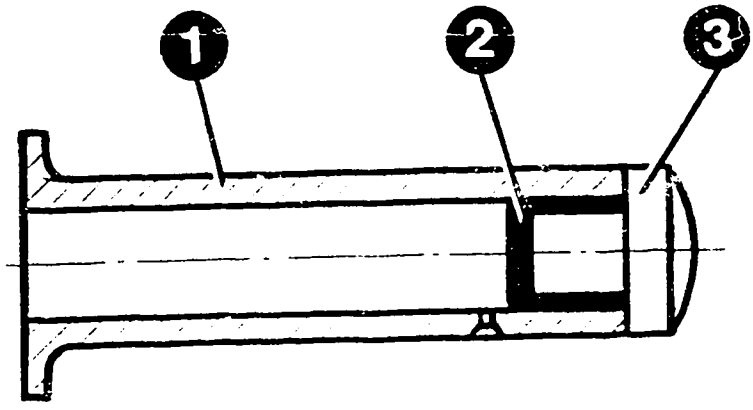


CHECKING AND ADJUSTING SLEEVE–STARTING TRAVEL

1 = Sliding sleeve
2 = Rubber sealing cap
3 = Plug

As of date of manufacture 927 the plug is secured in position in the sliding sleeve by means of a rubber sealing cap instead of by way of a tab washer.
The sliding sleeve features a countersunk restriction bore (see picture).
Rubber sealing cap may be installed instead of tab washer.
Sliding sleeve does not have to be replaced even if restriction bore is not countersunk.

Continue: J01/1 Fig.: H28/2

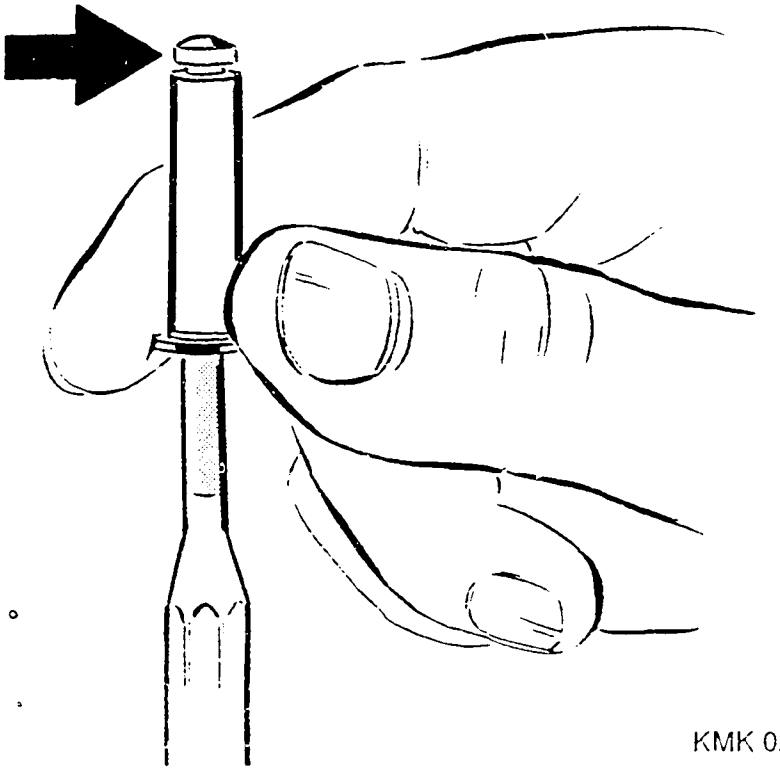


KMK 02351

CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL

Press out plug (arrow) with mandrel. When pressing in appropriate plug, pay attention to tab washer or rubber sealing cap.

Continue: J02/1 Fig.: J01/2



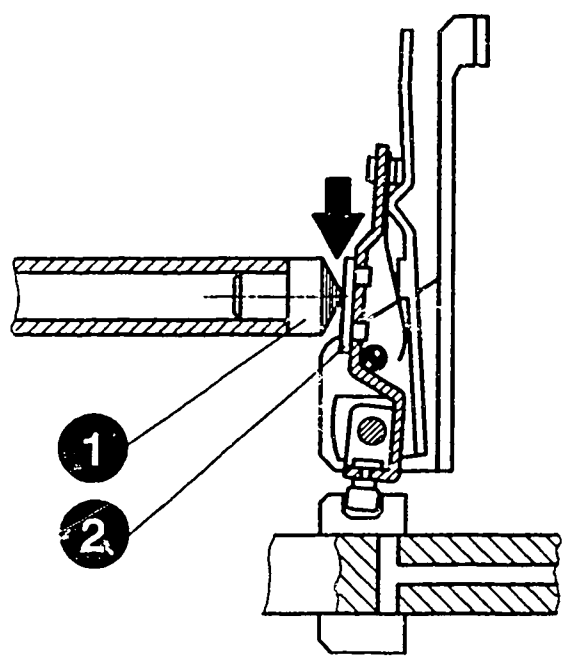
KMK 02352

CHECKING AND ADJUSTING SLEEVE-STARTING TRAVEL
* New plug version

1 = Plug
2 = Riveted-on plate

Pumps with plug and starting lever made of material DM05 - as can be seen from plug with grooves and starting lever with riveted-on plate (arrow) - may only be used in pairs.
Fit governor assembly and check "MS" again.
Insert governor section.
Fit housing cover, cylindrical helical coiled spring and control lever.

Continue: D17/1 Fig.: J02/2



KMK02357

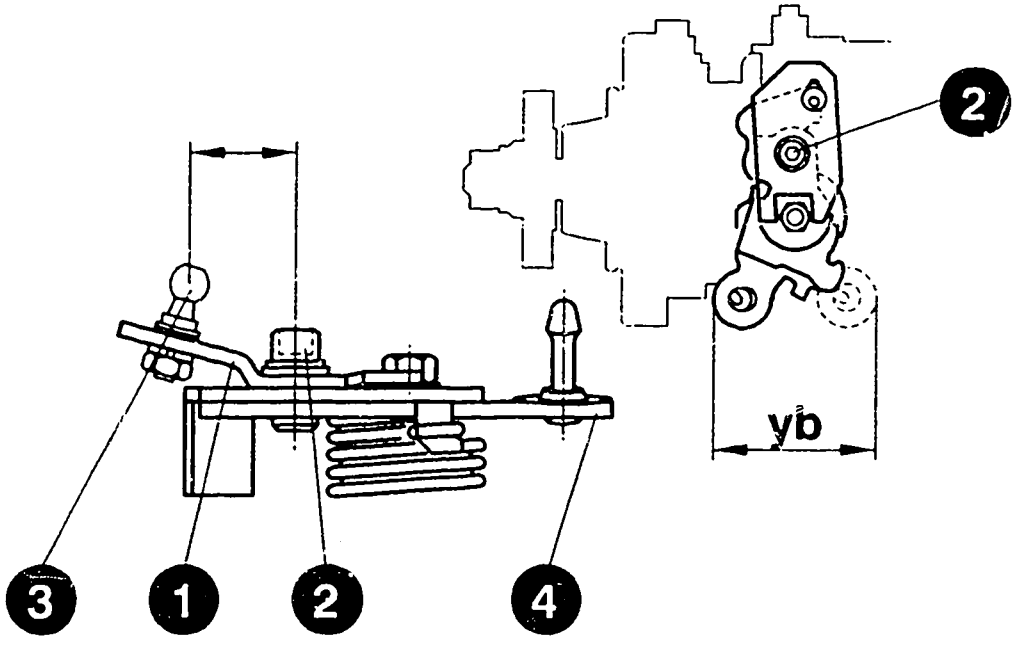
ATTACHING LEVER FOR SPRING-ACTUATED POWER ON/OFF DAMPER

* Pump with vacuum control valve

1 = Lever of spring-actuated power on/off damper
2 = Fastening screw
3 = Spherical bolt
4 = Speed-control lever

Attach lever as per service-parts list to speed-control lever.
Position speed-control lever against rated-speed stop starting from idle.
Measure adjustment-travel dimension Yb.

Continue: J04/1 Fig.: J03/2



KMK02359

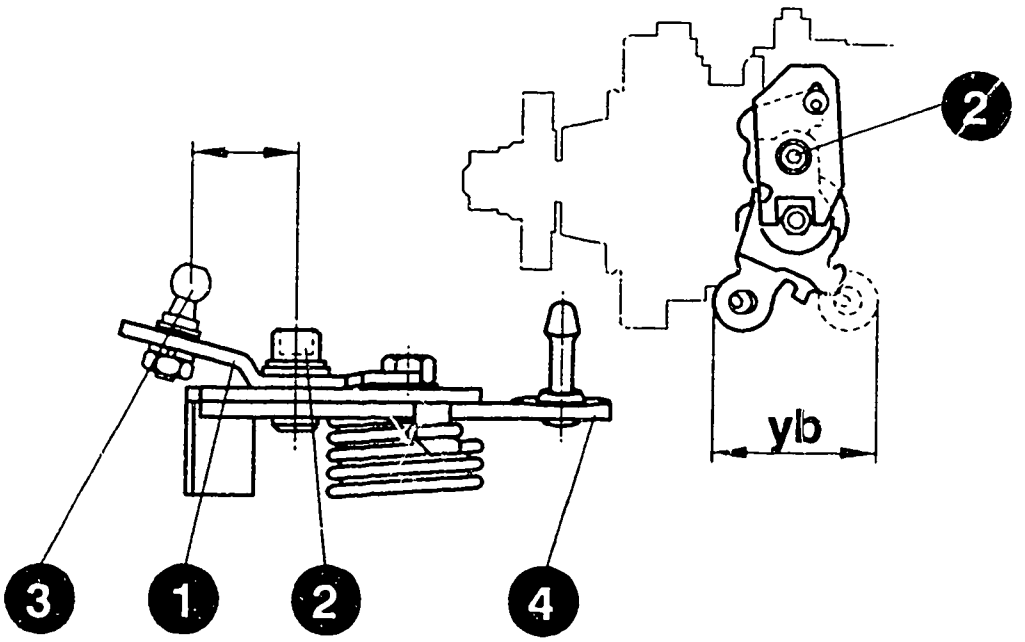
ATTACHING LEVER FOR SPRING-ACTUATED POWER ON/OFF DAMPER

* Pump with vacuum control valve

1 = Lever of spring-actuated power on/off damper
2 = Fastening screw
3 = Spherical bolt
4 = Speed-control lever

Measure distance between center of ball stud and center of fastening screw and adjust in line with dimension Yb.
Adjustment dimensions for ball stud in test-specification sheet.
Tightening torque, ball stud 3...5 Nm.

Continue: F12/1 Fig.: J04/2



KMK02359

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